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FINAL DEFINITE PROJECT REPORT AND FINAL ENVIRONMENTAL ASSESSMENT

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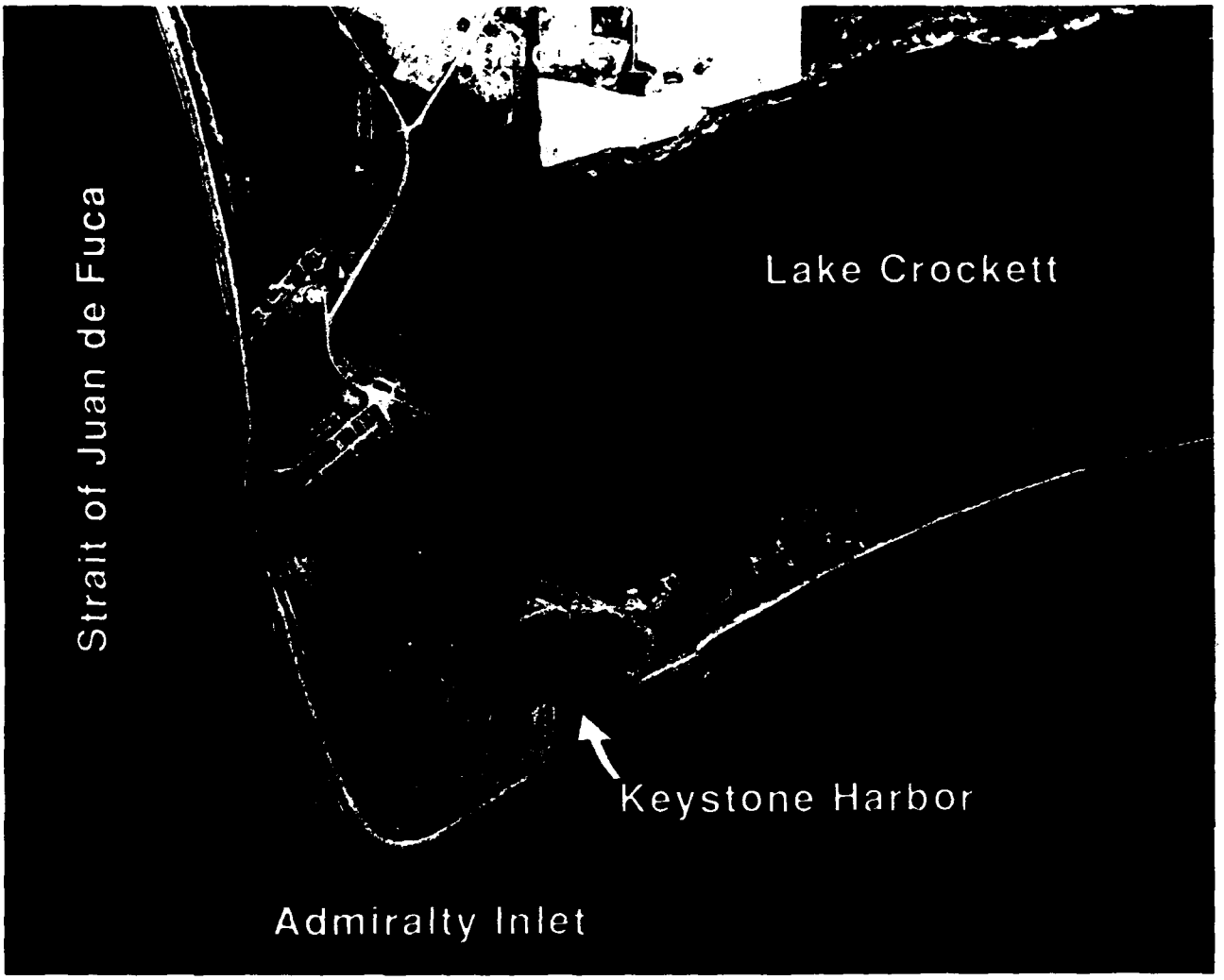
KEYSTONE HARBOR CHANNEL DEEPENING ADMIRALTY INLET, WASHINGTON



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October 1991

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FINAL DEFINITE PROJECT REPORT
FINAL ENVIRONMENTAL ASSESSMENT and FONSI

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KEYSTONE HARBOR CHANNEL DEEPENING

ADMIRALTY INLET, WASHINGTON

FINAL DEFINITE PROJECT REPORT

and

FINAL ENVIRONMENTAL ASSESSMENT

OCTOBER 1991

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NORTH PACIFIC DIVISION

SEATTLE DISTRICT, CORPS OF ENGINEERS

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Conducted under Section 107 of the 1960 River and Harbor Act, the Corps of Engineers study determined the feasibility of Federal involvement in deepening the existing Federal navigation channel at Keystone Harbor, Admiralty Inlet, Washington. The Washington State Department of Transportation (WDOT) operates an automobile ferry from Keystone Harbor on Whidbey Island to Port Townsend on the Olympic Peninsula of Washington state. Because of navigation safety risks, ferry trips are cancelled during low tide conditions. The study showed that all cancellations due to low tide could be eliminated if the channel were deepened to 25 feet below mean lower low water. The recommended plan includes dredging 48,000 cubic yards of material to deepen the channel and disposal at the nearest Puget Sound Dredged Disposal Analysis openwater site. Construction cost is estimated at $371,000 including the Federal cost of $250,000 and $121,000 by WDOT. No significant environmental impacts are expected.

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DEFINITE PROJECT REPORT

EXECUTIVE SUMMARY

This study to deepen the existing Federal channel at Keystone Harbor, Whidbey Island, was conducted under the authority of Section 107 of the 1960 River and Harbor Act, as amended. Section 107 authorizes the Secretary of the Army to allocate funds for planning, design, construction, and maintenance of small navigation projects when, in the opinion of the Chief of Engineers, such work is advisable. The study was requested by the Washington State Department of Transportation, Marine Division, Washington State Ferries (WDOT). The purpose of the study is to determine the feasibility and Federal interest in deepening the existing Federal channel to accommodate state ferries at low tides.

Keystone Harbor is on the west side of Whidbey Island, four miles across Admiralty Inlet from the city of Port Townsend and the shortest route to the Olympic Peninsula from Whidbey Island and the northern mainland of Washington state. The existing Federal channel is 1,000 feet long, 200 feet wide, and 18 feet deep. The harbor entrance is difficult to navigate due to swift cross currents. Under low tide conditions, the authorized project depth of -18 feet mean lower low water (MLLW) does not allow enough underkeel clearance to control the larger draft ferries presently used between Keystone and Port Townsend. At tides of -2.5 feet MLLW and lower, propeller cavitation is likely to develop with loss of rudder control and propeller thrust. Because of the risk of grounding, ferry trips are cancelled at these low tides resulting in delay, inconvenience, and increased cost for ferry users.

Several alternatives for improving safety and travel efficiency at Keystone Harbor were considered, including no action (no change in the authorized channel depth), channel deepening only (several depth increments considered), and channel widening and deepening. Coordination with ferry captains and engineering staff of WDOT indicates that the public interest would be best served by the recommended plan: channel deepening only, to a new authorized depth of -25 feet MLLW. Dredging of an estimated 48,000 cubic yards of material would be required with openwater disposal at the nearest Puget Sound Dredged Disposal Analysis (PSDDA) site 14 miles away.

The recommended plan:

- would increase navigation safety for state ferries at Keystone Harbor,

- would eliminate the need to cancel ferry service due to low tides, and thus increase travel efficiency for public transportation to and from the Olympic Peninsula,

- o is the most cost-effective plan for ensuring enough underkeel clearance for the ferries,

- o would not increase the channel shoaling rate or the cost of regular maintenance dredging,

- o would have no significant impacts to environmental features, including water quality, wetlands, wildlife, fishery resources, and cultural resources, and

- o is the plan approved by the local sponsor, WDOT.

Project first costs of the recommended plan total $343,000 (October 1990 prices) or $371,000 (full funded cost). Maintenance costs for the channel would not be increased and are not included in the cost-benefit analysis for the deepening project.

The full funded cost share plan amounts are estimated as follows:

Federal Cost Share. At the time of construction, the Government would provide 75 percent of the total cost of the general navigation facilities (GNF), estimated at $259,000. The local sponsor would reimburse the government for 2.5 percent of the total cost of the GNF or $9,000 (10 percent of the total cost of the GNF less local sponsor credit of 7.5 percent for costs associated with the dredged material disposal site) either at the end of construction or over time with interest. The net Federal construction cost share would then be $250,000.

Non-Federal Cost Share is estimated at $121,000, including 25 percent of the total cost of the GNF ($86,000 provided before construction), 2.5 percent of the total cost of the GNF reimbursed to the Government or $9,000 (plus interest if paid back over time), and $26,000 paid to the Washington State Department of Natural Resources for use of the PSDDA openwater disposal site.

Average annual costs over the 50-year project life including interest during construction would be $31,000. Project benefit analysis computed opportunity cost of delay benefits that would result from elimination of low tide trip cancellations by the deeper channel. Average annual benefits would be $70,500, resulting in a benefit-to-cost ratio of 2.3 to 1.

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ENVIRONMENTAL ASSESSMENT

FINDING OF NO SIGNIFICANT IMPACT

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C		Economic Analysis and Cost Sharing
D		Analysis of Design and Estimates of Cost

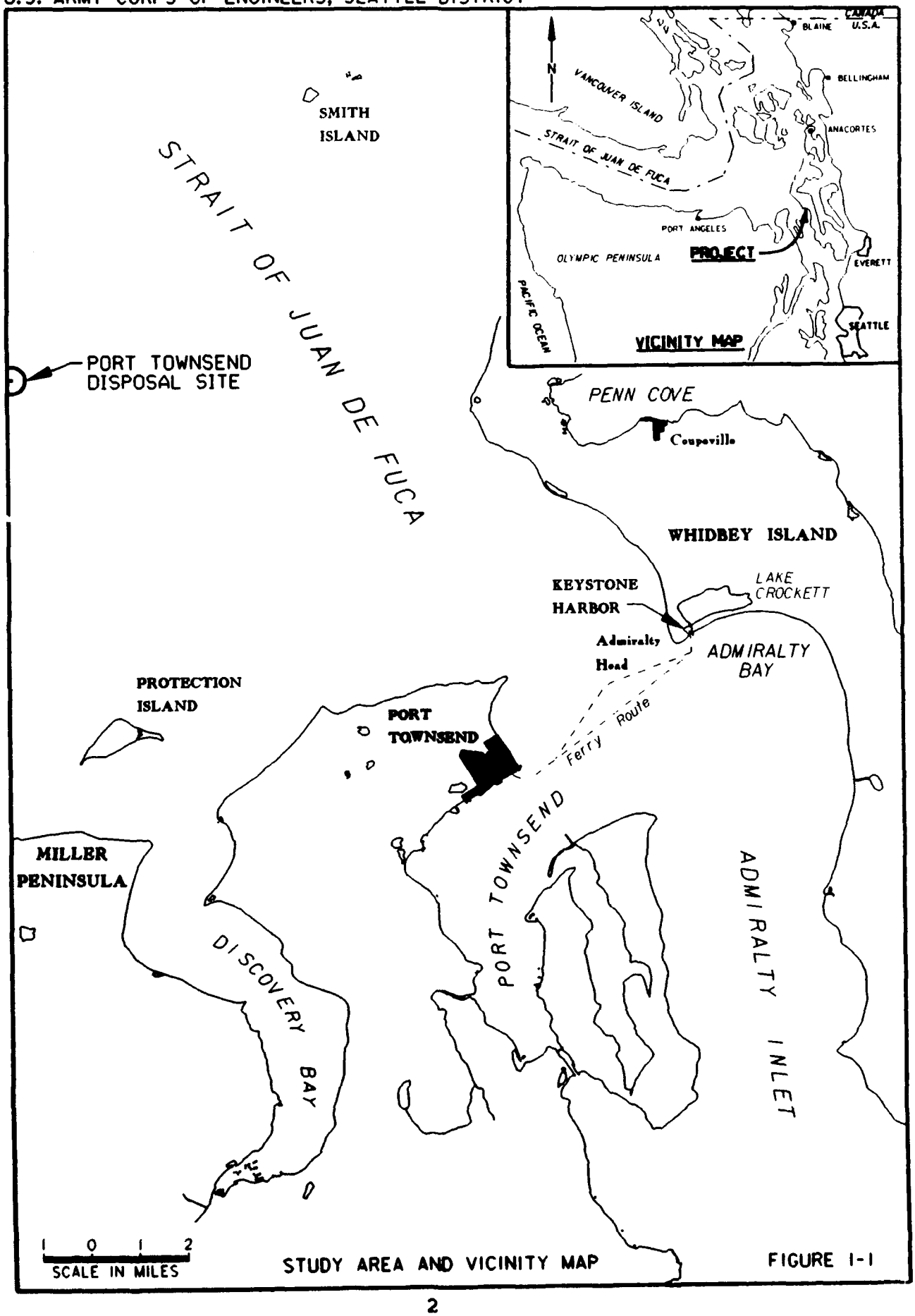
SECTION 1. BACKGROUND

1.01 Study Authority. This report is submitted under authority of Section 107 of the 1960 River and Harbor Act, as amended by Section 915 of the Water Resources Development Act of 1986 (Public Law 99-662). Section 107 authorizes the Secretary of the Army to allocate funds for planning, design, construction and maintenance of small navigation projects when, in the opinion of the Chief of Engineers, such work is advisable. Not more than $4 million of Federal funds can be allocated under this authority for planning, design, and construction of any one project.

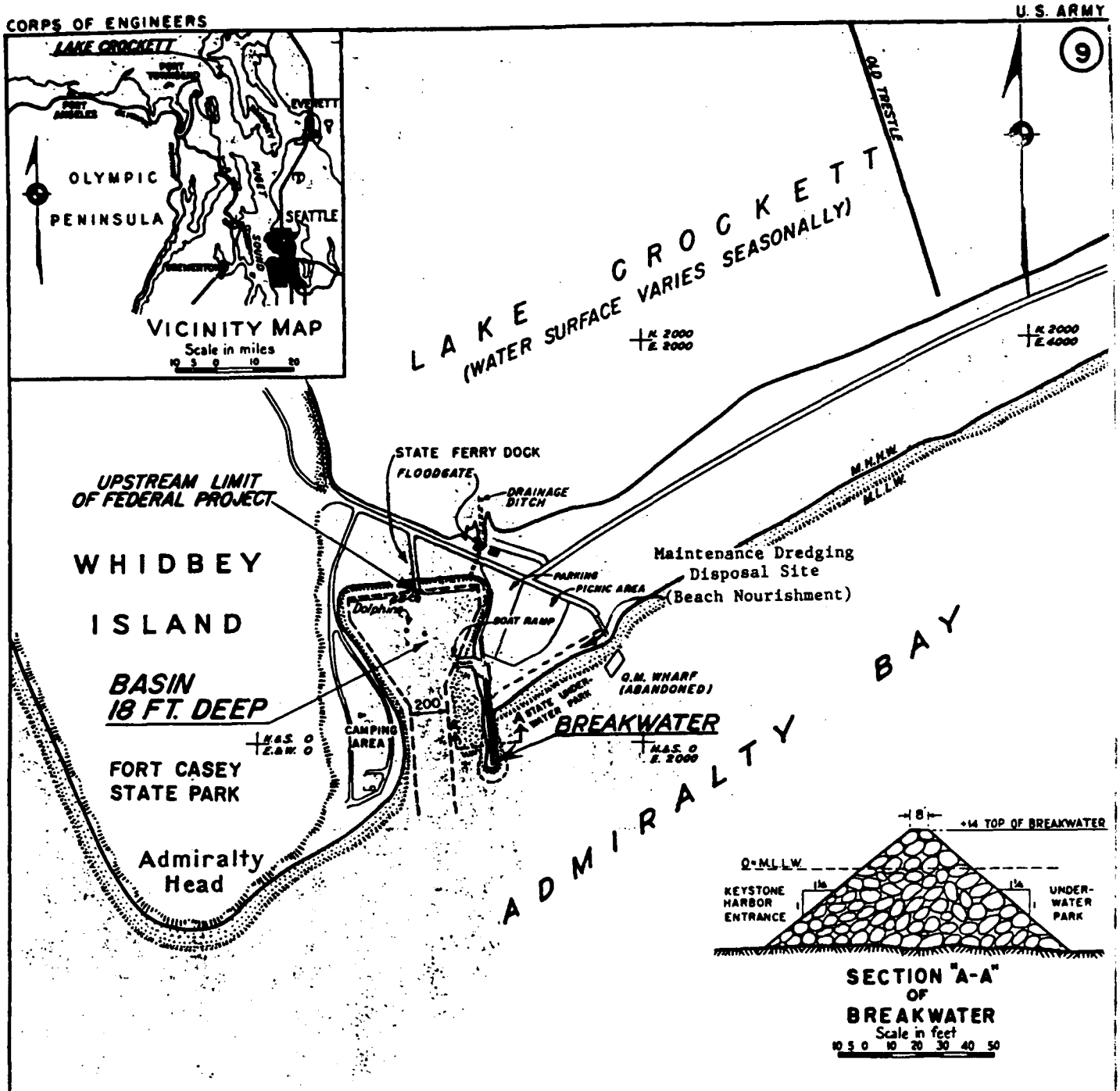
1.02 Type of Study. This definite project report (DPR) presents the results of a feasibility study for improving navigation and safety in an existing Federal channel used by the state-owned ferry system. The study was undertaken by the Seattle District, Corps of Engineers, under the above authority in response to a request from the Washington State Department of Transportation (WDOT), Washington State Ferries. The need for and desirability of undertaking a plan of improvement is presented. The accompanying environmental assessment (EA) addresses the environmental setting and effects of the proposed project.

1.03 Study Area. Keystone Harbor, Washington, is located on the west side of Whidbey Island, a distance of 4 nautical miles across Admiralty Inlet from the city of Port Townsend on the Olympic Peninsula (see figure 1-1). The western Washington mainland lies to the east and Vancouver Island to the northwest. Whidbey Island is connected to the mainland by a bridge over Deception Pass at the north end, and by ferry service at Keystone Harbor and at the southeast side of the island where ferries run from Clinton to Mukilteo, located just south of Everett, Washington. Coupeville, the county seat of Island County, is located about a mile to the north of Keystone Harbor and the city of Oak Harbor and Naval Air Station, Whidbey Island are located about 5 miles to the north. Keystone Harbor is approximately 50 miles northwest of Seattle.
The automobile/truck ferry run to Port Townsend is the shortest access route to the northern Olympic Peninsula from Whidbey Island and northwestern Washington state.

1.04 Keystone Harbor is an artificial harbor constructed by the Corps of Engineers in 1948 near the southwestern edge of Lake Crockett, hence the name Lake Crockett Project. A narrow beach of gravel separates the lake from the harbor. There is no navigation access to the lake. The Federal project includes a mooring basin, a navigation channel 1,000 feet long by 200 feet wide, a rock breakwater, and a boat launch ramp (see figure 1-2). WDOT operates a ferry from a dock at the head of the mooring basin. The authorized depth is -18 feet mean lower low water



STUDY AREA AND VICINITY MAP FIGURE 1-1



Note: This locality shown on NOAA chart 18441.

LAKE CROCKETT
WASHINGTON

SCALE IN FEET
500 0 500 1000 1500

U.S. Army Engineer District, Seattle, Washington
Revised September 1979, Dec 90

EXISTING PROJECT MAP

FIGURE 1-2

(MLLW). Actual depths after the last maintenance dredging in 1987 averaged -21 feet MLLW. In 1989 WDOT dredged some high spots resulting in an effective depth of -22 feet MLLW. Maintenance dredging of the channel is required every 4 to 6 years and typically involves removal of littoral drift material that moves easterly off Admiralty Head and is trapped in the west side of the navigation channel. Dredged material is routinely placed on the beach east of the breakwater as beach nourishment replacing littoral drift material cut off by the project.

1.05 Keystone Harbor lies within Fort Casey State Park. Thousands of visitors come each year to visit the gun emplacements built during the 1890's and to picnic, boat, and camp. The Underwater Park east of the breakwater and adjacent to the beach nourishment disposal site is a popular area for SCUBA diving. Lands for the park are outgranted by the Department of the Army to the Washington State Parks and Recreation Commission. The Commission has subleased a portion of the area to WDOT for ferry use. The Federal navigation project is located within the boundaries of the Central Whidbey Island Historic District, which is on the National Register of Historic Places.

1.06 Needs. Traffic demand on the Port Townsend-Keystone run has increased in recent years resulting in assignment of larger, deeper draft vessels than previously used on the run. The harbor entrance is difficult to navigate due to frequent swift currents at the channel entrance as well as wind generated waves. The typical entrance is made at full speed to maintain steerage against the current, and when the ferry comes under the protection of the breakwater, the engine is put into full reverse to slow the vessel down before approaching the dock and mooring. The authorized project depth of -18 feet MLLW does not allow enough underkeel clearance to control today's larger ferries at tides of -2.5 feet MLLW or lower. Ferry captains report a marked decrease in vessel controllability under these lower tide conditions with risk of grounding. This phenomenon, known as "cavitation," results from pressure anomalies about the propeller when a vessel has insufficient water under the hull. With propeller cavitation there is a subsequent loss of rudder control and reverse thrust. Therefore, ferry captains are reluctant to enter the channel during these lower tides and service must be suspended, resulting in delay and increased cost to the public. When ferry service is suspended, the users must choose one of three alternatives: wait until a favorable tide allows resumption of ferry service, cancel their trip, or spend 3.5 hours driving around via Clinton-Mukilteo and Edmonds-Kingston ferries to Port Townsend or to Keystone. In May through July of 1988, there were 84 sailings cancelled by low tides and an additional 8 one-way trips cancelled between mid-November and mid-December. In 1983 WDOT attempted to correct problems of negotiating the channel by dredging the channel deeper and cutting back the east channel slope to widen the maneuvering area. In 1988, WDOT did some additional dredging of selected areas. These efforts were not sufficient to solve the problem. By letter of September 21, 1988, WDOT requested that the Corps of

Engineers deepen the channel to accommodate ferries to low tides of as much as -4.5 feet MLLW (see appendix B, part 2).

1.07 Previous Corps of Engineers Studies or Reports. The project was adopted on March 2, 1945, under the name of Lake Crockett, Washington. An environmental evaluation dated September 30, 1975, was circulated and coordination completed for the first instance of disposal of maintenance dredged material as beach nourishment on the adjacent beach. An environmental assessment for maintenance dredging and beach disposal dated April 8, 1980 was prepared, followed by supplemental environmental assessments dated August 28, 1981, and June 2, 1987, each with Finding of No Significant Impact and Section 404(b)(1) evaluation.

1.08 Pertinent References. The following documents are pertinent to the general scope of the present study:

Favorable Section 107 Initial Reconnaissance Report, Keystone Harbor, Admiralty Inlet, Washington, April 14, 1989, Corps of Engineers, Seattle District.

Agreement between the United States of America and the Washington State Department of Transportation for the Keystone Harbor, Admiralty Inlet, Washington, Channel Deepening Study (Feasibility Study Cost Sharing Agreement), signed July 3, 1990. Includes scope of studies for this report.

Other references pertinent to the social, economic, engineering and design, and environmental aspects of the study are listed in the accompanying appendices.

SECTION 2. PLANNING OBJECTIVE AND CRITERIA

2.01 Planning Objective. The planning objective for this study is to increase safety and travel efficiencies for public ferry transportation to and from the Olympic Peninsula via the Federal channel at Keystone Harbor.

2.02 Planning Criteria.

a. General. In formulating a plan to meet the planning objective, a number of planning criteria were considered. These criteria were used to screen and evaluate alternative plans and to measure each plan's contribution to the national economic development (NED), environmental quality (EQ), regional economic development (RED), and other social effects (OSE) accounts from the Water Resources Council's Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies of March 1983. The comparative evaluation of alternative plans developed during initial plan formulation is presented in section 3. Not all the criteria are compatible and no plan could fully satisfy all of them. However, the recommended plan (see section 4) comes the closest to satisfying the criteria. Applicable planning criteria for the study are presented in the following paragraphs under the account to which they are primarily related.

b. National Economic Development Criteria. The NED criteria are used to evaluate the effects of alternative plans on the NED account which displays changes in the economic value of the national output of goods and services. The pertinent NED criteria are as follows:

- Provide a safe navigation channel for existing Keystone ferries at tides as low as -4.5 feet MLLW.

- Reduce tidal delay costs incurred by ferry users as a result of vessel trip cancellations due to low tide.

- Measure economic efficiency of alternative plans by net benefit analysis (net benefits equal total average annual benefits minus total average annual costs).

- Use the congressionally mandated Federal interest rate to determine the present worth of annual costs and annual benefits (currently 8-3/4 percent).

- Use a 50-year project economic analysis period to evaluate plans.

- Ensure that each separate unit or purpose of a plan provides benefits at least equal to its cost unless combined beneficial NED and EQ effects outweigh combined adverse NED and EQ effects.

o Include in average annual cost estimates interest and amortization of construction costs and provisions for annual maintenance, operation, and major component replacement.

o Include all actions in each plan necessary to realize its economic benefits.

o Ensure that plans are implementable within a range of likely future economic conditions.

See Section 3, "Formulation and Evaluation of Alternatives," and appendix C, "Economic Environment and Project Economic Evaluation," for application of the NED criteria.

c. Environmental Quality Criteria. The EQ criteria are used to evaluate the effects of alternative plans on the EQ account which displays nonmonetary effects on significant natural and cultural resources. The EQ criteria includes those imposed by Federal, state, and local regulations and those uniquely related to the Whidbey Island-Island County area. The significant environmental resources of this area are described in the Environmental Assessment (EA). The pertinent EQ criteria are as follows:

o Preserve the natural and beneficial values of the undeveloped portions of the saltwater flood plain in the study area in conformance with Executive Order (EO) 11988. The requirements of EO 11988 are presented in more detail in the EA.

o Preserve the wetlands in the study area in conformance with EO 11990. The requirements of EO 11990 are presented in more detail in the EA.

o Preserve important or critical fish and wildife habitats in the study area, including the State Underwater Park adjacent to the Federal breakwater.

o Preserve or salvage significant (as determined by National Register of Historic Places criteria) historic and prehistoric cultural resource sites affected by potential project construction or effects in accordance with the Historic Preservation Act of 1966; the Reservoir Salvage Act of 1960, as amended by Public Law 93-291; EO 11593; and the Archaeological Resources Protection Act of 1977.

o Maintain consistency with state and national coastal zone management requirements. Current Washington state law (Shoreline Management Act of 1971) does not require a shoreline permit if Federal developments are to be undertaken by the Federal Government on lands owned in fee by the Federal Government.

o Protect any threatened or endangered species in the study area and their critical habitat.

- o Preserve water quality in the study area.

- o Preserve recreational values within the study area.

Several potential problems relating to EQ criteria have been eliminated by the decision to deepen, but not to widen, the channel. See the EA.

d. Regional Economic Development Criteria. The RED criterial are used to evaluate the effects of alternative plans on the RED account which registers changes in the distribution of regional economic activity that result from each alternative plan. The pertinent RED criteria are as follows:

- o Contribute to the more efficient transport of commuters travelling between Island and Jefferson Counties.

e. Other Social Effects Criteria. The OSE criteria are used to evaluate the effects of alternative plans on the OSE account which registers plan effects from perspectives that are relevant to the planning process, but are not reflected in the other three accounts. The categories of effects in the OSE account include urban and community impacts; life, health, and safety factors; displacement; long-term productivity; and energy requirements and energy conservation. The pertinent OSE criteria are as follows:

- o Increase cohesion between communities of Island County and communities of the northern Olympic Peninsula.

- o Avoid inconvenience to travellers from ferry cancellations due to low tides.

- o Avoid decreasing aesthetic values in the study area.

- o Avoid increased noise levels in the study area.

SECTION 3. FORMULATION AND EVALUATION OF ALTERNATIVES

3.01 Plan Formulation Approach. The plan formulation process began with the identification of the planning objective and the planning criteria. Structural and nonstructural alternatives were then identified to address the planning objective. Alternatives which satisfied the planning objective emerged from the preliminary screening and were further evaluated and refined. Refinements were based on the results of additional technical studies and interagency and local sponsor coordination to formulate realistic alternatives. Final alternatives were evaluated against the planning criteria, and a detailed system of accounts was developed to measure their contribution to the NED, EQ, RED, and OSE accounts of the Water Resource Council's Principles and Guidelines. Based on the results of this analysis, the alternative that resulted in maximum net economic return, consistent with protecting environmental quality, was designated the recommended plan.

3.02 Preliminary Analysis and Screening of Alternatives. Conceptual alternatives formulated in response to the navigation safety need at Keystone Harbor were:

- o no action
- o channel deepening only
- o channel deepening and widening
- o channel realinement
- o relocation of the ferry terminal
- o construction of a second breakwater

3.03 Plan Formulation Results. As a result of preliminary screening, channel realinement, relocation of the ferry terminal, and construction of a second breakwater were dismissed as too costly to be supported by the small amount of benefits due to elimination of tidal delay. Channel deepening and widening was eliminated when coordination with WDOT indicated that sufficient depth would solve the navigation problem and that widening would not be necessary. No action was carried into the final analysis for comparison with the selected plan. Channel deepening only was selected as the only alternative that satisfies the planning objective of providing a safe entrance to Keystone Harbor at all tides as well as being economically feasible and avoiding adverse environmental impacts. This alternative was chosen as the recommended plan. A description of the alternatives follows.

3.04 Alternative 1 - No Action. The concept of no action reflects the "without" project plan condition and provides the basis for comparison of the other concepts and the recommended

plan. No action would result in the continued maintenance of the existing 200-foot-wide channel to a depth of -18 feet MLLW (plus 2 feet overdepth allowance) with dredging approximately every 4 to 6 years and disposal at the beach nourishment site. Maintenance dredging typically removes the littoral drift material that collects first at the extreme western side of the channel. As a result of maintenance dredging, the remaining portion of the channel, where critical ferry maneuvers occur, will remain at the depth of last deepening by WDOT in 1989 or -22 feet MLLW. For navigation safety reasons, Keystone ferry captains would generally continue to avoid entering the harbor at tides of -2.5 feet or lower and ferry sailings would continue to be cancelled during these tidal conditions. Vessel cancellations would continue to cause delays, inconvenience, and extra cost to private and commercial traffic travelling to and from the northern Olympic Peninsula. This alternative was dismissed as being unresponsive to the planning objective of providing a safe entrance to Keystone Harbor for all tides and increasing travel efficiencies for public transportation to and from the peninsula.

3.05 Alternative 2 - Channel Deepening Only. This alternative would dredge the Federal channel below the existing authorized depth of -18 feet MLLW and maintain the channel to a new authorized depth to accommodate the existing 13.5-foot loaded draft ferries during low tides. Deepening the entrance channel to a sufficient depth would eliminate propeller cavitation and subsequent loss of rudder control and reverse thrust that presently occur during low tides of -2.5 feet or lower. A naval architect for WDOT has determined that 7 feet of underkeel clearance are required to ensure control of the class of ferries used at Keystone Harbor taking into account their double-ended propulsion system and the reverse thrust maneuver from full speed ahead. Deepening would reduce or eliminate vessel trip cancellations that occur during low tide conditions and result in a more efficient and safer transportation system between Port Townsend and Keystone. There would be no widening or cutting back by dredging of the existing 200-foot channel. Sediments would be dredged by clamshell dredge and taken by barge to the PSDDA openwater disposal site located 14 miles westerly in the Strait of Juan de Fuca. There would be no increase in operation and maintenance as a result of channel deepening. Five different increments of channel depth were examined as shown below.

a. Variation 1, Inner Channel 25 Feet Deep, Outer Channel 23 Feet Deep (Reconnaissance Study Plan). Reconnaissance studies included observation from the ferry bridge during passage into Keystone Harbor and an interview with the master to gain an understanding of the navigation problem (see Section 1, paragraph 1.06, Needs). This preliminary plan was formulated to provide enough underkeel clearance to ensure controllability under all low tide conditions. The plan would provide 25 feet of depth including 7 feet of underkeel clearance in the inner 500 feet of channel where backing down in reverse is practiced. The outer 500 feet of channel would be dredged to a depth of 23 feet. When reviewing the plan, the Port Captain of the ferry system stated

that the 25-foot depth needs to be extended into the outer channel to allow vessels to begin full reverse sooner upon entering, thereby allowing a sufficient safety margin for executing the slowing and docking maneuver. However, having a channel with a short outer reach at a 23-foot depth and a longer inner reach at a 25-foot depth could introduce additional problems. Deepening the entire channel to the same depth is more likely to ensure uniform vessel response during the use of full reverse at any point in the approach to the ferry terminal. Variation 1 was eliminated in favor of variation 4 as not being fully responsive to the need for a safe entrance channel.

b. Variation 2, Channel 23 Feet Deep. Under this plan, the entire 1,000 feet of channel would be dredged to a depth of 23 feet. This variation would accommodate the existing Keystone ferries without risk of cavitation to tides as low as -2.5 feet MLLW (13.5 ft draft + 7 feet clearance + 2.5 ft = 23.ft). Ferry trip cancellations for tides of -2.5 feet MLLLW would be eliminated by dredging to -23 feet, providing some benefits. However, cancellations would continue for tides lower than -2.5 feet. It is estimated that this variation would require dredging and disposal of 29,000 c.y. and would have a first cost of $235,000. Based on annual benefits of $11,000 and annual costs of $21,000, the benefit-cost ratio (B/C) is 0.52 to 1.

c. Variation 3, Channel 24 Feet Deep. This variation would eliminate those ferry cancellations which would have occurred when tides range between -2.5 and -3.5 feet. Dredging quantities are estimated at 38,000 c.y., first cost at $284,000, annual benefits at $31,000, annual costs at $26,000, and net annual benefits at $5,000. The B/C is 1.2 to 1.

d. Variation 4, Channel 25 Feet Deep (Recommended Plan). This variation would eliminate ferry cancellations which would occur when tides range between -2.5 feet and -4.5 feet (extreme low tide). It is superior to variations 2 and 3 in that virtually all tidal delays would be eliminated. This variation includes an added safety margin over variation 1 in that it would permit vessels to begin full reverse farther out in the entrance channel, thereby allowing a longer distance for slowing and docking the ferries. Deepening the entire channel is required to allow uniform vessel response at any point in the approach to the ferry terminal. This variation is responsive to the planning objective of providing a safe vessel entrance under all tidal conditions resulting in increased public transportation efficiency to and from the Olypmic Peninsula. Dredging quantities are estimated at 48,000 c.y., first cost at $343,000, annual benefits at $70,500, annual costs at $31,000, and net annual benefits at $39,500. The B/C is 2.3 to 1. This variation is the most economically efficient plan, i.e., maximizes net benefits, and is therefore the NED plan. Upon approval by WDOT this variation was chosen as the recommended plan (see correspondence in appendix B, part 2).

e. Variation 5, Channel 26 Feet Deep. Like variation 3, this variation would eliminate the need for tidal cancellations by providing over 7 feet of underkeel clearance at the lowest tide, -4.5 feet. The dredging quantities are estimated at 59,000 c.y. and the first cost at $400,000. The benefits are the same as in variation 4, $70,500, but due to higher costs and lower net benefits at $34,500. the B/C of 2.0 to 1 shows less economic efficiency.

3.06 Alternative 3 - Channel Deepening and Widening. This alternative is similar to alternative 2, providing additional underkeel clearance for vessel controllability, but it also cuts back the channel slope a minor amount to increase channel width. This alternative was eliminated in the reconnaissance study phase for the following reasons:

1) Coordination with WDOT indicates that increasing channel width is not essential to safe operation, but that channel depth is the factor that most influences vessel control. (See Appendix B, part 2, for correspondence with WDOT on sufficiency of channel deepening.)

2) The plan is not economically efficient. The existing channel slopes are very steep in the outer, narrow portion of the channel. Cutting the slope farther back would mean removal of a large amount of material at a cost that would produce no additional benefits beyond the channel deepening only alternative.

3) The amount of widening is limited on the east by proximity to the rock breakwater and the boat launch ramp and on the west by proximity to the Fort Casey State Park campground. The extent to which these structures would be undermined if the channel were widened was not fully assessed once it was determined that widening was not required to accomplish the study objective.

4) Cutting back the slope would remove intertidal habitat whereas deepening only would avoid this adverse environmental impact.

3.07 Alternative 4 - Channel Realinement. The configuration of the existing harbor is not conducive to altering the channel alinement in the area where it would be most effective, that is, in the outer, narrow reach of the channel. Realinement there would require considerable dredging of steeply sloped banks and be significantly more costly than channel deepening. Some channel deepening might be required as well, depending on the underkeel clearance needed for the modified ferry operations. This alternative was eliminated in the reconnaissance study phase.

3.08 Alternative 5 - Relocation of the Ferry Terminal. There is no suitable place on Admiralty Head to which the terminal could be relocated without encountering some adverse currents. The

harbor was dredged originally to provide protection from such difficult conditions as had been experienced at the adjacent quartermaster wharf (abandoned remains located east of the breakwater) during unloading operations there. Relocation elsewhere would be very costly. Also, relocation to a place farther away from Port Townsend would increase ferry operating costs by eliminating this shortest possible ferry route to the northern Olympic peninsula.

3.09 Alternative 6 - Construction of a Second Breakwater. A second breakwater could possibly be placed so as to further modify currents and provide additional protection for vessels entering the harbor. This alternative was eliminated early in the reconnaissance study as being significantly more costly than channel deepening without providing additional benefits. A rock breakwater would require covering up and loss of intertidal and subtidal habitat.

3.10 A comparison of variation 4, Channel 25 Feet Deep, with "no action" is presented in table 3-1.

TABLE 3-1
SUMMARY COMPARISON OF FINAL ALTERNATIVES

ITEM	ALTERNATIVE 1 NO ACTION Without Project Plan	ALTERNATIVE 2, VARIATION 4 CHANNEL DEEPENING ONLY NED/RECOMMENDED PLAN
a. Plan Description		
1. Structural Measures	Maintain existing channel 1000' x 200' x -18'MLLW Dredging: 32,500 c.y. every 4 to 6 yrs Beach nourishment at project	Deepen channel to -25 ft MLLW Openwater disposal 48,000 c.y. No increase in maintenance dredging volume or frequency
2. Nonstructural Measures	Cancel ferry trips at tides of -2.5 ft or lower	Operate ferries on all tides
3. Fish and Wildlife Mitigation	Not Applicable	Dredging timed to avoid interference with salmonid migration Disposal at PSDDA site will comply with seasonal use restriction designed to minimize adverse effects on shrimp
b. Estimated Cost		
1. Construction Cost	None	$ 343,000
Interest during Construction	None	3,000
Total Investment Cost	None	$ 346,000
		Full Funded Cost 1/
		$ 371,000
Federal Cost Share	None	$ 250,000 2/
Non-Federal Cost Share	None	$ 121,000 2/ 3/

1/ Includes cost escalation to midpoint of construction period.
2/ Includes repayment to Govt by sponsor of $9,000 (10 % of GNF - 7.5% credit for disposal fee).
3/ Includes sponsor payment of DNR openwater disposal fee ($26,000).

TABLE 3-1 (cont.)

ITEM	ALTERNATIVE 1 NO ACTION Without Project Plan	ALTERNATIVE 2, VARIATION 4 CHANNEL DEEPENING ONLY NED/RECOMMENDED PLAN
2. Annual Maintenance Cost		
Federal	Not Determined	No Change
Non-Federal	$0	$0
c. Response to Planning Criteria		
Planning Objective		
-increase ferry transportation safety	No	Yes
-increase travel efficiency at Keystone	No	Yes
1. National Economic Development		
(a) Vessel controlability at low tides	Loss of control Risk of grounding	Good control; deep enough to eliminate propeller cavitation
(b) Opportunity cost of delay for ferry users due to low tide trip cancellations	Delays due to low tides continue, Costs continue	Eliminate delays for low tides Eliminate delay costs
(c) Total average annual benefits	Loss $70,500	Benefit $70,500
(d) Total average annual costs	Not applicable	$31,000
(e) Benefit-Cost Ratio	Not applicable	2.3 to 1
2. Environmental Quality		
(a) Preserve wetlands	No change	No impact
(b) Preserve critical habitats	No change	No significant impact

TABLE 3-1 (cont.)

ITEM	ALTERNATIVE 1 NO ACTION Without Project Plan	ALTERNATIVE 2. VARIATION 4 CHANNEL DEEPENING ONLY NED/RECOMMENDED PLAN
(c) Preserve cultural resources	No change	None identified in channel
(d) Protect threatened/ endangered species	No significant impact to bald eagle	No significant impact
(e) Preserve water quality	No change	No significant change
(f) Preserve recreational values	No change	No change
3. Regional Development.		
(a) Efficiency of transport between Island and Jefferson counties	No change	Increase
4. Other Social Effects.		
(a) Community cohesion	No change	Long term beneficial
(b) Traveler inconvenience	Marked in summer	Immediate decrease
(c) Aesthetic values	No change	No change
(d) Noise levels	No change	No significant change
(e) Air pollution	No change	No significant change

SECTION 4. THE RECOMMENDED PLAN

4.01 Plan Description. The general plan layout is shown on plate 1. The plan consists of dredging the existing 200-foot-wide Federal channel from station 5+00 to station 15+00 to a depth of -25 feet MLLW. The authorized channel depth would be changed from -18 feet to -25 feet MLLW. There would be no widening or cutting back by dredging of channel slopes.

4.02 Navigation Conditions. Strong cross currents, narrow channel width, and wind generated waves combine to make Keystone Harbor the most difficult of all state ferry terminals to enter. Captains typically bring a ferry into the channel at full speed and, after the stern of the vessel is out of the influence of the cross current, full reverse is applied and the docking maneuver begins. At low tides there is not sufficient water under the hull of a 13.5-foot-draft ferry to maintain vessel control. Propeller cavitation can occur with loss of thrust and rudder "bite" and the vessel may drift and be grounded. A propeller clearance of at least 7 feet is required for vessel control. With existing depths at -22 feet MLLW, it is the practice to cancel ferry runs at tides of -2.5 feet or lower. By deepening the channel to -25 feet MLLW, there will be sufficient propeller clearance at all tides. The need for cancellations due to low tides would be eliminated.

4.03 Tides and Currents. Tides of Admiralty Inlet are of the mixed type and have the diurnal inequality typical of the Pacific coast of North America. Extreme tidal elevations range from -4.5 feet to +12.00 feet MLLW. Tidal currents can be in excess of 4.8 knots at Admiralty Head and generally flow past the entrance to Keystone Harbor from east to west for both ebb and flood tides.

4.04 Winds and Wind Generated Waves. The harbor is exposed to wind waves from the east, south, and west and to ocean swell from the west. Storm generated waves approach from the southwest to southeast. Winds can exceed 70 miles per hour. The maximum estimated wave at the harbor entrance has a height of 7.0 feet and a period of 5 to 6 seconds.

4.05 Hydraulics. For the proposed simple channel depth modification, ship simulation testing was considered unnecessary. The primary change would be to provide additional propeller clearance to avoid cavitation.

4.06 Longshore Transport. Littoral drift moves easterly from Admiralty Head and northerly and westerly along the shores of Admiralty Bay east of the project. Construction of Keystone Harbor created a trap for the Admiralty Head feed source resulting in shoaling inside the harbor and erosion of the beach immediately east of the breakwater. The present rate of shoaling in the harbor is about 6,500 cubic yards (c.y.) annually. The material collects first at the west side of the channel and is removed by dredging every 4 to 6 years and deposited on

the eroding beach (see figure 1-2). For nearly 30 years the material dredged has balanced that eroded.

4.07 Geotechnical. Subsurface exploration for the Keystone Harbor deepening project was conducted by the Seatte District, Corps of Engineers. Nine Vibracore test holes were drilled on December 7, 1990, using a 4-inch diameter Vibracore sampler. The nine Vibracore samples were taken for biological, chemical, and physical analysis in conjunction with PSDDA guidelines. Visual classifications from the Vibracore tubes were made in accordance with the "Unified Soil Classification System." The foundation materials consist primarily of medium to dense silty sands in the northern region of the dredging site. The southern region of the dredging site consists of a loose to medium gravelly sand (1" minus) layer atop the medium to dense silty sand with gravel (1" minus). At the dredging site, shell composition ranged from no shells (0 percent) to 5 percent with an average of about 3 percent shell fragments by volume. See plate 1 for test hole locations and plate 2 for Vibracore boring logs.

4.08 Design Criteria. Primary design criteria included vessel draft, required underkeel clearance to avoid propeller cavitation, testimony of masters with experience on the Keystone run, acceptable benefit-to-cost evaluation, and minimum adverse environmental impacts.

4.09 Structural Features (Federal).

a. Navigation Channel Depth. The existing 200-foot-wide, 1,000-foot long channel would be dredged to a new authorized depth of -25 feet MLLW.

b. Navigation Channel Width. The existing inner channel sideslopes vary from 1 vertical (V) on 2.8 horizontal (H) to 1 V on 3.8 H and appear to be very stable. The proposed deepening will not include cutting back the existing channel sideslopes, so the channel width of 200 feet will not be obtained at the -25-foot depth. Since most of the channel is already at -22 feet (due to non-Federal actions), it is expected that only minor sideslope sloughing will occur as a result of deepening with only minor narrowing of the channel at -25 feet. Future maintenance specifications would be based on the angle of repose of the stabilized sideslopes. Since the deepening is intended only to provide sufficient volume of water under the vessel hull to avoid propeller cavitation, WDOT ferry captains do not consider a channel width of slightly less than 200 feet (at a 25-foot depth) a problem (see WDOT coordination letters in appendix B2).

c. Dredged Material Disposal. The preferred disposal plan is to remove the material, estimated at 48,000 c.y., by clamshell dredge and take it by bottom-dump barge to the Port Townsend site, a Puget Sound Dredged Disposal Analysis (PSDDA) openwater disposal site 14 miles west of Keystone Harbor in the Strait of Juan de Fuca. The channel would be deepened in late 1992 after the regular maintenance dredging. There may not be enough room

on the beach for both maintenance and deepening quantities; therefore, maintenance material will be given priority for disposal at the beach nourishment site. The proposed channel deepening material was sampled and tested and found suitable for openwater disposal according to PSSDA guidelines. Full chemical characterization analyses showed no chemicals with concentrations requiring biological testing. See the environmental assessment (EA) for additional information on the testing results.

An alternative disposal plan would be to offer the material for some beneficial use that is environmentally acceptable and would not cost the Government more than the openwater disposal plan. Also, the dredging schedule should not be impacted, and beneficial use proponents would need to secure all permits and approvals at their expense. Recent experience with a capping project in Elliott Bay has demonstrated that special disposal activities are not easily undertaken and can require payment of fees to Washington State Department of Natural Resources if state bottom lands are involved. At a meeting on November 28, 1990, environmental resource agencies recommended beneficial use and offered to research some possible uses. During coordination with Washington State Department of Fisheries staff at the Point Whitney lab on possible use of deepening sediments for enhancement of clam beds, we were advised that the sediments, mostly silty sands, are too fine to serve well for this use. Similarly, they are probably too fine for optimum beach nourishment use. We have coordinated with staff of Washington State Parks and Recreation Commission on continued reservation of the beach nourishment site at Keystone Harbor for maintenance dredged material (coarser sediments).

4.10 Aids to Navigation. There exists a navigation light marking the end of the Federal breakwater protecting Keystone Harbor. No additional navigation aids would be required.

4.11 Real Estate. The project lands, including the channel, breakwater site and beach nourishment site are owned by the Department of the Army. Those lands above the original ordinary high water line have been outgranted to the State of Washington Parks and Recreation Commission for 25 years, beginning March 15, 1976, and ending March 14, 2001. Under the terms of the lease, the Government retains the right to use the leased land for maintenance of the Federal project. No additonal land is required for the deepening project, if as expected, the openwater disposal plan is implemented. However, if upland areas are required as part of the selected disposal plan, the local sponsor shall be responsible to provide disposal areas and shall be entitled to credit (see discussion of LERRD, section 4.18 a and d). If it is determined that uplands are required for disposal, the land value will be included in the final report.

4.12 Environmental Effects of the Recommended Plan.

a. General. The environmental impacts of deepening, but not widening, the Federal channel would be similar to impacts of

regular maintenance dredging. Most of the impacts would be of short duration, occurring during and shortly after dredging. These would include increased turbidity and decreased dissolved oxygen in the water column, increased noise and motor emissions, and a reduction in waterfowl use of the harbor. The deepening operation would result in permanent removal and loss of benthic organisms at the dredging site. Recolonization of the exposed material with benthic organisms is expected to occur after dredging. There should be no permanent impact on intertidal habitat. The dredging operation is timed for December to early January to avoid the closure for shrimp of Port Townsend openwater disposal site (September 1 through November 30), the peak outmigration of juvenile salmonids (March 16 through June 15), and the recreational season at Fort Casey State Park (summer through Labor Day). Since no significant impacts are expected, no mitigation is proposed. See the EA for a detailed evaluation of alternative actions and a description of the environmental consequences.

b. Endangered/Threatened Species. Bald eagles frequent Fort Casey State Park for feeding and resting. The marbled murrelet may winter in the project area. Biological assessments (BA) were prepared for the bald eagle (threatened) and the marbled murrelet (proposed for listing as threatened in Washington). The BA's conclude that the project would not impact either species (see the EA, section 5.h).

4.13 Cultural Resources and Historic Significance. There are no known archaeological sites in the project area. The project area is located within the boundaries of the Central Whidbey Island Historic District but dredging the site will not affect any of the historic qualities of the district. See appendix B, part 2, for coordination with the Washington State Heritage Council and the Advisory Council on Historic Preservation.

4.14 Project Costs. Estimated project first costs are summarized in table 4-1 and detailed in appendix D.

TABLE 4-1
SUMMARY OF ESTIMATED PROJECT FIRST COSTS

	Oct 1990 Price Level	Full Funded Price 1/
Mobilization	$ 59,000	$ 64,000
Dredging & Openwater Disposal	192,000	209,000
PSDDA Site Use Fee	24,000	26,000
TOTAL CONSTRUCTION COST	$ 275,000	$ 299,000
Planning, Engineering, & Design 2/	41,000	43,000
Construction Management (Supervision & Inspection)	27,000	29,000
TOTAL PROJECT FIRST COSTS	$ 343,000	$ 371,000

1/ Includes cost escalation to the midpoint of construction.
2/ Includes Real Estate Div labor costs for finalizing LCA estimated at $2,000.

4.15 Design and Construction Schedule. The planning, design, and construction schedule for the deepening project is summarized below and shown in more detail on plate 3. Subject to higher authority approval and availability of funds, the channel deepening project would be completed in January 1993 assuming the following schedule is maintained.

Submit Final Report to Division office	Oct 1991
Initiate Plans and Specifications	Dec 1991
Request Project Approval	Apr 1992
Sign Local Cooperation Agreement	Jul 1992
Advertise Construction	Jul 1992
Award Contract	Sep 1992
Notice to Proceed	Sep 1992
Complete Construction	Jan 1993

4.16 Maintenance (Federal). Deepening of the Federal channel is not expected to increase channel shoaling. The existing channel already traps all of the littoral drift material moving easterly from Admiralty Head. The material will continue to collect at the west side of the deepened channel at the present shoaling

rate and will continue to be removed by maintenance dredging at 4 to 6 year intervals and placed on the adjacent beach as beach nourishment. For purposes of this report, channel maintenance is considered a separate action from the one-time channel deepening action. Each would require separate approvals under section 404 of the Clean Water Act. Maintenance costs are excluded from cost estimates for the deepening project.

4.17 Economics of the Recommended Plan.

a. General Methodology. The economic justification of the recommended plan is determined by comparing the average annual costs with average annual NED benefits which would be realized from the plan. A 50-year period of economic analysis was selected in analyzing the recommended project. Benefits and costs were based on October 1990 price levels. The first year of project operation was assumed to be 1993. See appendix C for additional information on the economic analysis.

b. Benefit Methodology. Benefits were based on 1988 ferry cancellations due to low tide and were computed as follows: determine the time saved per vehicle as a result of the deepening project and multiply by the number of vehicles delayed by low tide cancellations times the average number of people per vehicle times the opportunity cost of delay for business or leisure travelers. It was assumed that most people would choose to wait for the next ferry (an average delay of 1.9 hours or a maximum delay of 4 hours) rather than cancel the trip or drive around via the quickest route, Clinton-Mukilteo and Edmonds-Kingston ferries (3.5 hours). For business (weekday) travelers, the opportunity cost of delay (OCD) was based on the average after-tax hourly wage rate for the two counties involved in the Keystone crossing. The OCD for adult leisure (weekend) travelers was taken as 1/3 the before tax wage rate, and the OCD for children as 1/4 the adult rate. The OCD's for the three respective groups were estimated at $6.75, $2.64, and $0.67 and represent the cost per hour of tidal delay to each type of traveler.

c. Incremental Channel Depth Analysis. The OCD benefits were computed for several channel depths and compared with channel costs to determine the optimum project depth or the depth at which the net benefits are at their maximum. See Summary Table 4-3, column 2.

d. Project Costs. First costs estimated for dredging at various depths and the resulting average annual costs are shown on table 4-2. Interest during construction was computed by compounding interest over the 2-month construction period at 8-3/4 percent.

TABLE 4-2

SUMMARY OF PROJECT FIRST COSTS, INVESTMENT COSTS, AND ANNUAL COSTS

First Costs ($1,000)	Channel Depth			
	23 ft	24 ft	25 ft	26 ft
Project First Cost	$235	$284	$343	$400
Interest during Const.	2	2	3	4
Investment	$237	$286	$346	$404
Annual Costs ($1,000)				
Interest & Amortization (50 yrs at 8-3/4 %)	$21	$26	$31	$36
Operation & Maintenance	0	0	0	0
Total Annual Cost	$21	$26	$31	$36

e. Benefit-Cost Summary. As shown in table 4-3, a channel depth of -25 feet is the optimum project depth. The benefit-cost ratio for this channel depth is 2.3 to 1.

TABLE 4-3

SUMMARY OF ECONOMIC ANALYSIS

Waterway Depth (Feet)	Average Annual Benefits	Average Annual Costs	Total Net Benefits	Benefit-Cost Ratio
23	$11,000	$21,000	$-10,000	0.52 to 1
24	31,000	26,000	5,000	1.2 to 1
25	70,500	31,000	39,500	2.3 to 1
26	70,500	36,000	34,500	2.0 to 1

4.18 Cost Sharing. Cost sharing of the estimated full funded construction costs was conducted in accordance with cost apportionment requirements of the Water Resources Development Act of 1986 (Public Law 99-662), as amended. The local sponsor of this project is the Washington State Department of Transportation. A local cooperation agreement (LCA) between the Department of the Army and the local sponsor will be signed shortly before construction to ensure that local cost sharing requirements are met. Cost sharing requirements are as follows:

a. The local sponsor shall provide at no cost to the Government all lands, easements, and rights-of-way, including dredged material disposal areas, and perform, or assure performance of, all alterations and relocations of facilities and utilities (except relocations or alterations of highway bridges and railroad bridges and approaches thereto) (LERRD) determined by the Government to be necessary for construction, operation, or maintenance of the project.

b. Effective December 1989 an agreement was established between the Corps of Engineers, the Environmental Protection Agency Region 10, and the Washington State Departments of Ecology and Natural Resources (DNR) on sites and procedures for openwater disposal of dredged sediments in the Puget Sound area of Washington state. The agreement is presented in the Management Plan Report, Unconfined Openwater Disposal of Dredged Material, Phase I (Central Puget Sound) dated June 1988 and Phase II (North and South Puget Sound) dated September 1989. As part of the PSDDA planning process, it was determined that a user fee would be charged by DNR for dumping at the prescribed disposal site. For Federal navigation projects, this fee would be paid by the local sponsor where a sponsor exists. Where there is no sponsor, e.g., Duwamish Waterways, Swinomish Channel, no fee would be charged. For the Keystone Harbor deepening project, the local sponsor, WDOT, would be responsible to pay to DNR the PSDDA fee for using the Port Townsend openwater disposal site. This fee is $.40 per c.y. of material deposited and is payable at the time of disposal.

c. For commercial navigation projects, Public Law 99-662 requires the local sponsor to provide a cash contribution equal to the following percentages of the total cost of constructing the general navigation features of the project that modify depths allocated to commercial navigation. Since this project has less than a one-year construction period, these funds must be provided by the local sponsor to the Federal Government prior to construction contract award.

(1) Ten percent of the costs attributable to the portion of the general navigation featires of the project which has a depth not in excess of 20 feet. Given the current channel depth of -22 feet MLLW, shoaling rate, and channel deepening occurring concurrently or shortly after maintenance dredging, all general navigation features costs were assumed to be cost shared based on a channel depth in excess of 20 feet but not in excess or 45 feet as shown in paragraph 4.18c(2) below. If during project construction any material associated with channel deepening is dredged between -18 through -20 feet MLLW, that cost will be cost shared at 10 percent local sponsor and 90 percent Federal Government.

(2) Twenty-five percent of the costs attributable to the portion of the general navigation features of the project which has a depth in excess of 20 feet but not in excess of 45 feet.

d. The local sponsor, at his option, shall either repay, without interest, a lump sum at the end of construction and within 90 days of final accounting or repay in annual installments with interest over a period not to exceed 30 years following completion of the project or separable element thereof, an additional 0 to 10 percent of the total cost of the general navigation features allocated to commercial navigation. The actual percentage paid depends on the value of all lands, easements, rights-of-way, relocations (including utilities), and dredged material disposal areas provided by the local sponsor in support of the project. If the value allowed for such items is less than 10 percent of the total cost of constructing the general navigation features of the project, the local sponsor shall repay an additional percentage of the total general navigation features cost equal to the difference between 10 percent of the total cost and the percentage of the total cost represented by the value of such items. If the credit allowed is equal to or greater than 10 percent of said total cost, the local sponsor shall not be required to repay any additional percentage of the total general navigation features cost. This report treats the disposal fee, discussed in paragraph 4.18b, as creditable toward the local sponsor's additional 10 percent repayment. In this case, instead of providing land and/or dikes for upland disposal, the sponsor is utilizing the least-cost disposal option which is open water but results in a cost paid 100 percent by the local sponsor. As such, the disposal fee was considered to be an intrinsic part of providing the dredged material disposal area. The computation of general navigation features costs, as well as the credit allowed toward the additional 10 percent of the general navigation features cost, is shown in table 4-4.

TABLE 4-4

COMPUTATION OF GENERAL NAVIGATION COSTS AND ALLOWED CREDIT

Total Project Cost (Full Funded)	$371,000
Less: PSDDA disposal site usage fee	26,000
General Navigation Costs	$345,000

Computation of Credit Allowed toward Additional 10 Percent

LERRD	$ 26,000	=	7.5 % of Gen. Nav. Feat.
Gen. Nav. Feat.	$345,000		

Based on the above full funded cost estimate and computation of credit, the local sponsor would receive an estimated credit of 7.5 percent toward the additional 10 percent of Keystone Harbor general navigation features costs. Non-Federal interests would be responsible for 27.5 percent (25.0 percent upfront + 10 percent - 7.5 percent) of general navigation features

construction costs. In summary, total non-Federal cost responsibilities are comprised of 100 percent of the PSDDA disposal site fee, 25 percent of the general navigation features cost paid prior to construction contract award plus an additional 2.5 percent of the general navigation features cost to be repaid to the Federal Government either in a lump sum amount, without interest, at the end of construction within 90 days of final accounting or in annual installments, with interest, over a 30-year period. Itemized non-Federal construction costs are shown in table 4-5.

TABLE 4-5

ITEMIZED NON-FEDERAL COSTS

Item	Dollar Value
PSDDA Site Disposal Fee	$26,000
Gen. Nav. Features - Upfront ($345,000 x 0.25)	86,000
Gen. Nav. Features - Repayment ($345,000 x 0.025)	9,000
Total Non-Federal	$121,000

4.19 Federal Construction Cost Sharing. At the time of construction, the Federal Government (Corps of Engineers) will pay for 75 percent of the total general navigation features cost which consists of channel dredging and disposal of dredged material (less the DNR user fee) or $345,000 x 0.75 = $259,000 full funded cost. This includes 2.5 percent of the total general navigation features cost ($345,000 x 0.025 = $9,000 full funded cost) which at the option of the local sponsor will be reimbursed to the Federal Government, either at the end of construction without interest (within 90 days of final accounting) or over time up to 30 years with interest. The net cost after reimbursement to the Federal Government would be $250,000.

4.20 Local Sponsor Assurances. Required local sponsor assurances are listed in section 6 (Recommendations) of this report. The Washington State Department of Transportation, as local sponsor of the channel deepening project, has furnished formal assurance that they possess the legal and financial authority and capability, under applicable Federal authority and other laws, to assume the non-Federal responsibilities for the proposed project.

4.21 Financial Analysis. The purpose of the financial analysis is to ensure that the non-Federal sponsor understands the financial commitment involved and has a reasonable plan for meeting that commitment. A financial analysis consists of: (1) the non-Federal sponsor's statement of financial capability, (2) the local sponsor's financing plan, and (3) the Corps of

Engineers assessment of the local sponsor's financial capability. All project costs have been full funded to the mid-point of construction in order to achieve a more realistic estimate of costs to be paid by the local sponsor.

a. Statement of Financial Capability. The Washington State Department of Transportation's statement of financial capability is presented as exhibit A on the following page.

b. Financing Plan. The sponsor's financing plan is presented as exhibit B and follows exhibit A.

c. Assessment of Financial Capability. Financing will be accomplished by the local sponsor through a WDOT, Marine Division, 1991-92 biennium budget request for deepening Keystone Harbor. Assuming WDOT receives the requested funding from the Washington State Legislature, the local sponsor's plan to finance its cash share of construction costs and disposal fee is satisfactory and sufficient.

EXHIBIT A

KEYSTONE HARBOR CHANNEL DEEPENING

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
MARINE DIVISION
STATEMENT OF FINANCIAL CAPABILITY

1. GENERAL

The Washington State Department of Transportation (WSDOT), Marine Division, local sponsor for the Keystone Harbor channel deepening project, is capable of meeting cost sharing and other obligations as required under the terms of the Local Cooperation Agreement. WSDOT acknowledges that its financial participation in the total project costs of $371,000 will be approximately $121,000 based upon the project cost estimate in the Draft Definite Project Report by the U.S. Army Corps of Engineers. Contract Award activities are expected to occur during Government Fiscal Year 1992, if federal funds are available, with construction starting in FY93.

2. SPONSOR CONTRIBUTIONS

Exhibit B is the sponsor's Financial Plan, which shows the estimated amount to be paid by the local sponsor and schedule of sponsor costs. Prior to construction contract award, the WSDOT will pay approximately $86,000 in cash to the U. S. Army Corps of Engineers and an estimated $26,000 to the Washington State Department of Natural Resources. Total cash requirements due prior to contract award are an estimated $112,000. After construction and within 90 days of final accounting, WSDOT will pay an estimated $9,000 in cash, without interest, to the U. S. Army corps of Engineers. These cash contributions will be funded as follows:

CASH - The WSDOT Marine Division requested via their operating budget dated May 19, 1990, that $123,000 be authorized for dredging Keystone Harbor to -25 feet. This amount represented WSDOT estimated obligations at the time of the funding request (May, 1990). Any funding obligations above the $123,000 will be fulfilled by transferring funds from other operating program categories to the subject project. The operating budget was approved by Admiral H. W. Parker, Assistant Secretary for Marine Transportation, and is included in the agenda for the 1991 session of the Washington State Legislature.

3. CONCLUSION

Upon the approval of the Washington State Legislature, WSDOT Marine Division funding sources will be in place for a contract award in Government Fiscal Year 1992. WSDOT recognizes that the costs in the Statement of Financial Capability and Financial Plan are estimates only. WSDOT will take whatever actions are needed to have our required funds for the project available on a timely basis as requested. WSDOT understands that the local sponsor will not be responsible for contributions to future operation and maintenance costs of the Federal project.

Warren L. Johnson 5/31/91

Warren L. Johnson, P.E.
Terminal Construction Engineer

EXHIBIT B

KEYSTONE HARBOR CHANNEL DEEPENING
FINANCING PLAN

SCHEDULE OF ESTIMATED FEDERAL AND NON-FEDERAL EXPENDITURES
($1,000)

GOVT FISCAL YEAR	FEDERAL [1]	NON-FEDERAL CASH	LERR&D	UTIL.	OTHER [3]	TOTAL
1992	$259	$86	$0	$0	$26	$371
REPAYMENT [2] AFTER FINAL ACCT. (FY 1993)		$ 9				

NOTES:

1. Includes an estimate of $9,000 to be reimbursed, without interest, by the local sponsor within 90 days of final accounting.

2. Sponsor will repay to Federal Government $9,000 (2.5% of total cost of General Navigation facilities, $259 + $86 = $345) as follows: Payment will be made within 90 days of Final Accounting by the Government, with no interest added.

3. Paid by sponsor to Washington State Department of Natural Resources.

Warren L. Johnson 5/31/91

Warren L. Johnson, P. E. Date
Terminal Construction Engineer

SECTION 5. COORDINATION

5.01 Coordination Framework.

a. General. Coordination was accomplished during the study with Federal, state, and local agencies through meetings, telephone calls, and correspondence. Coordination began during the reconnaissance study phase with solicitation of a planning aid letter from the U.S. Fish and Wildlife Service. In August 1990 a plan for chemical testing of proposed dredged sediments was coordinated with the other PSDDA agencies. In December 1990 the Corps of Engineers executed the sampling plan. Upon review of the resulting chemical analyses, the agencies determined that the proposed dredged material is suitable for disposal at the Port Townsend PSDDA openwater site. (See Memorandum, dated April 4, 1991, following the EA.) The initial agency coordination meeting was held in November 28, 1990. There was no expressed opposition to the project and no further agency coordination meetings were held.

b. Public Information Meeting. On July 2, 1990, the local sponsor, the Washington State Department of Transportation, and the Seattle District Corps of Engineers held a public workshop at Coupeville, Whidbey Island, Washington. No private citizens appeared and no public comments were received at the meeting.

5.02 Coordination with Key Agencies.

a. State of Washington, Department of Transportation, Marine Division (Washington State Ferries) (WDOT). Extensive coordination has been maintained with WDOT's planning, engineering, and ferry operations branches in developing the recommended plan. Coordination with ferry captains began with observation from the bridge of a ferry by the Corps hydraulic engineer/designer as the ferry was being navigated into the harbor, interview with the master, and approval of the deepening only alternative (see appendix B, part 2, Corps of Engineers letter dated December 20, 1989, and response from WDOT dated February 1, 1990). Two plan formulation meetings were held with WDOT in September and October 1990 including a review of the deepening plan by the Port Captain of the ferry system and subsequent administrative level approval of the recommended plan (see appendix B, part 2, Corps of Engineers letter dated October 30, 1990, and WDOT response dated November 27, 1990). WDOT has agreed to provide the local cooperation requirements as reflected in their letter dated March 8, 1991 (see appendix B, part 2).

b. National Marine Fisheries Service (NMFS). Fishery concerns expressed in the initial interagency meeting were coordinated with NMFS.

c. U.S. Fish and Wildlife Service (FWS). FWS prepared a planning aid letter dated January 1990 during the reconnaissance study and coordinated resource agency concerns during preparation of the draft and final Fish and Wildlife Coordination Act (FWCA) Reports. The final report, which includes planning recommendations, is found in appendix B, part 3. Corps of Engineers responses to the recommendations are found in appendix B, part 3, immediately following the FWCA report.

d. U.S. Environmental Protection Agency, Region 10 (EPA). EPA participated in the initial interagency meeting, in the scoping of sediment testing, and in the evaluation of sediments for openwater disposal. EPA recommended clamshell dredging and investigation of beneficial uses for deepening sediments.

e. U.S. Coast Guard (USCG). Draft DPR/EA was provided to USCG in June 1991.

f. State of Washington, Department of Ecology (WDE). Coordination has been maintained with WDE throughout the study, beginning with scoping of the sediment testing plan. Recommended clamshell dredging and beneficial use of sediments dredged from channel deepening.

g. State of Washington, Department of Fisheries (WDF). Fishery concerns expressed in the inititial interagency meeting were coordinated with WDF and guidance requested on possible beneficial uses of dredged sediments. We were advised that the sediments, mostly siltly sands, are too fine for clam bed enhancement.

h. State of Washington, Department of Natural Resources (DNR). DNR participated in the scoping of sediment testing. Environmental concerns expressed in initial interagency meeting were coordinated with DNR.

i. State of Washington, Office of Archaeology and Historic Preservation (SHPO). See appendix B, part 2, for letter from Washington State Heritage Council for SHPO resulting from study coordination.

j. State of Washington, Parks and Recreation Commission (Parks). Coordination has been maintained with Parks throughout the study regarding possible impacts to Fort Casey State Park and the state underwater park adjacent to the navigation channel. Parks would like Corps material dredged for the deepening project material to increase beach feed normally reserved for maintenance dredging disposal. See Corps response to Parks letter of December 13, 1990 in appendix B, part 4.

k. State of Washington, Department of Wildlife (WDWL). Environmental concerns expressed in the initial interagency meeting were coordinated with WDWL.

1. Island County Planning Department (Island County). Coordination was maintained with Island County throughout the study beginning with the initial interagency meeting.

5.03 Coordination of Draft Report. The draft DPR/EA was distributed for a 30-day public and agency review in June 1991 to 50 agencies and organizations. See appendix B, part 1 for a summary of the draft DPR/EA mailing list. Eight letters of comment were received from the public and agencies. These letters and the Corps of Engineers responses are found in appendix B, part 4. There were no expressed comments opposing the project.

SECTION 6. RECOMMENDATIONS

6.01 I recommend that the existing 200-foot-wide, 1,000-foot-long Federal navigation channel at Keystone Harbor be deepened to -25 feet MLLW and that the authorized project depth be changed from -18 feet MLLW to -25 feet MLLW in the manner described in this report, with such modification thereof as in the discretion of the Commander, HQUSACE, may be advisable. There would be no increase in the existing project maintenance requirements as a result of channel deepening. The estimated full funded cost sharing plan total is $371,000 for construction, provided that prior to construction local interests agree to the following provisions:

a. provide without cost to the United States all lands, easements, and rights-of-way, including dredged material disposal areas, required for channel deepening and for aids to navigation upon the request of the Chief of Engineers (if needed);

b. accomplish without cost to the United States all alterations and relocations of buildings, roads (except relocations or alterations of railroad bridges and highway bridges and approaches thereto), and other structures and improvements determined by the United States to be necessary for construction and operation and maintenance of the deepening project;

c. perform all utility relocations or alterations determined by the United States to be necessary for construction of the deepening project;

d. hold and save the United States free from all damages arising from the construction, operation, and maintenance of the project, except for damages due to the fault or negligence of the United States or its contractors;

e. provide and maintain without cost to the United States adequate berthing areas with depths commensurate with those in the Federal improvements, and necessary mooring facilities, utilities, and a public landing and parking area for ferry system operations;

f. provide a cash contribution equal to 10 percent of the costs attributable to the portion of the general navigation features, allocated to commercial navigation, which has a depth not in excess of 20 feet, plus 25 percent of the costs attributable to the portion of the general navigation features, allocated to commercial navigation, which has a depth in excess of 20 feet but not in excess of 45 feet;

g. repay within 90 days of final accounting without interest or with interest, over a period not to exceed 30 years

following completion of the project, an additional 0 to 10 percent of the total cost of the general navigation facilities, depending on the value of items provided pursuant to items a and b above;

h. pay all project costs in excess of the Federal cost limitation of $4 million as provided in Public Law 86-645, as amended by the Water Resources Development Act of 1986.

The Washington State Department of Transportation further agrees to the following:

i. Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 88-352), and Department of Defense Directive 5500.II issued pursuant thereto and published in Part 300 of Title 32, Code of Federal Regulations, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army."

j. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646), as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way for construction and subsequent operation and maintenance of the project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said act.

The net cost (after reimbursement) to the Federal Government for construction of the recommended channel deepening improvements is estimated at $250,000.

Date: 2 October 1991

Milton Hunter
Colonel, Corps of Engineers
District Engineer

ENVIRONMENTAL ASSESSMENT

FINAL ENVIRONMENTAL ASSESSMENT
CHANNEL DEEPENING
KEYSTONE HARBOR, WASHINGTON

1. Project Description. This Environmental Assessment (EA) addresses the dredging and disposal of material from deepening the navigation channel at Keystone Harbor (figures 1-1 and 1-2 in the main report). The existing Federal project at Keystone Harbor (Lake Crockett), Whidbey Island, Washington, constructed in 1948 by the Corps of Engineers, includes a dredged moorage basin, a Federal channel, a rock breakwater and a boat launch ramp. The surrounding lands are leased to the Washington State Parks and Recreation Commission for Fort Casey State Park. The 200-foot wide channel leading to the Keystone Ferry Terminal is maintained to the authorized depth of -18 feet mean lower low water (MLLW). Actual depths vary between -18 feet and -23 feet due to an overdepth allowance of 2 feet and additional dredging by the Washington State Department of Transportation (WDOT). A complete description of the existing project is available in section 1 of the original EA for maintenance dredging, dated April 8, 1980, and available for review from Seattle District files (U.S. Army Corps of Engineers, 1980). This EA does not discuss impacts of regular maintenance dredging and disposal of maintenance material on the adjacent beach. A separate EA, Section 404 evaluation and public notice, will be distributed shortly before the next maintenance dredging event planned for September 1992.

2. Need for the Action. The Keystone-Port Townsend state ferry run is a major gateway to and from the Olympic Peninsula for private cars and commercial traffic. The larger vessels used in recent years to carry the increasing traffic cannot use the channel safely at low tides and ferry service must be suspended, resulting in delay and increased cost to the public. The Keystone Harbor entrance is difficult to navigate due to frequent strong currents and high winds. To maintain control, ferry captains enter at full speed and when the vessel is out of the influence of the cross current, full reverse is applied and maneuvering for approach to the ferry dock begins. There have recently been two ferry groundings. As a result, the Washington State Department of Transportation (WDOT) requested that the Corps study the feasibility of deepening the entrance channel to Keystone Harbor.

3. Affected Environment.

a. General. The terrain surrounding Keystone Harbor and nearby Lake Crockett is hilly and forested except along the beach to the east which is covered with sparse grass and brush. The

harbor lies within the Fort Casey State Park and the Central Whidbey Island Historic District. The state park is heavily used in summer for sightseeing, overnight camping, and diving at the state underwater park adjacent to the harbor. Local homes and development along the shore are mainly recreational in nature. The waters of Admiralty Bay are used for sport and commercial fishing, along with pleasure boating.

b. Fish and Wildlife. A great variety of marine life occurs in the immediate vicinity. The nearshore bottom between the breakwater and wharf is fairly shallow with small rock outcrops. Sparse algae and a few horse clams (Tresus sp.) have been observed here. The pilings of the wharf serve as substrate for barnacles (Balanus spp.) and sea anemones (Metridium sp.), which provide cover and habitat for several species of fish. These pilings also support numerous tube worms. The breakwater provides substrate for barnacles, anemones, chitons, mussels, and other organisms. Snails, hydroids, sea cucumbers, crabs, sea urchins, starfish, wolf eels, greenlings, penpoint gunnels, and lingcod also inhabit this area. Biota within the channel is limited to opportunistic species which may colonize the area between maintenance dredging periods. Juvenile salmonids migrate along the shoreline in great numbers between April and June. Waterfowl utilize both Lake Crockett and Keystone Harbor throughout the year, though peak abundance occurs during fall migration. Raptors are also common along the shores of Lake Crockett, while shorebirds are numerous during Fall migration (August-October). Pandalid shrimp are present offshore in high numbers in the fall. Marine mammals are found in the vicinity, though seldom in the navigation channel.

c. Sediment Quality. Subsurface sediment exploration for the Keystone Harbor deepening project was conducted by Corps of Engineers Seattle District on December 7, 1990. Nine Vibracore samples were taken for biological, chemical, and physical analysis in conjunction with PSDDA guidelines. The analysis indicated that the sediments in the northern region of the dredging site consist primarily of medium to dense silty sands. The southern region of the site consists of a loose to medium gravelly sand (1" minus) layer on top of the medium to dense silty sand with gravel (1" minus).

Percent shell composition (shell fragments by volume) ranged from 0 percent (no shell) to 5 percent, with an average of about 3 percent. See plates 1 and 2 following the EA for vibracore logs and sampling locations.

Chemical analyses of sediments sampled found no chemicals of concern with concentrations above PSDDA screening levels (SL) that would trigger bioassay testing. Therefore, according to PSDDA protocol, the dredged material is suitable for openwater disposal at the Port Townsend PSDDA site. See Memorandum for

Record, dated April 4, 1991, documenting the PSDDA agencies' decision on suitability for openwater disposal (page EA-10).

d. Water Quality. The water quality of Admiralty Inlet is rated "Class AA" as defined by Washington State Department of Ecology standards. Water quality of this class exceeds the requirements for all uses such as wildlife habitat, esthetic enjoyment, commerce and recreation, and fish and shellfish reproduction, rearing and harvest. Water quality information from samples collected in the general area of Admiralty Inlet in recent years generally confirm the Class AA rating.

e. Threatened and Endangered Species. The only species on the Federal list of Endangered and Threatened Wildlife and Plants in the Keystone area is the bald eagle (U.S. Fish and Wildlife Service, 1990). Wintering bald eagles are in the vicinity between October 31 and March 31, and nesting bald eagles are present between January 1 and August 15. The nearest bald eagle nest to the project area is about four miles away. The U.S. Fish and Wildlife Service advises us that the marbled murrelet, proposed for the Federal list as threatened in Washington, may winter in the project area.

4. Alternative Actions. Alternatives are described in detail in the Definite Project Report.

a. No Action. This alternative would involve no action on the part of the Federal Government. No action would result in the continued maintenance of the existing 200-foot-wide channel to a depth of -18 feet MLLW with dredging approximately every 4 to 6 years and disposal at the beach nourishment site. For navigation safety reasons, Keystone ferry captains would not enter the harbor at tides of -2.5 feet or lower and ferry sailings would continue to be canceled during these tidal conditions. Vessel cancellations would continue to cause delays, inconvenience, and extra cost to private and commercial traffic travelling to and from the northern Olympic Peninsula. This alternative was dismissed as being unresponsive to the planning objective of providing a safe entrance to Keystone Harbor for all tides and increasing travel efficiencies for public transportation to and from the peninsula. Environmental impacts would remain at status quo.

b. Upland Disposal. This alternative would involve rehandling to load the dredged material onto trucks and hauling to an, as yet undesignated, upland site. This alternative would involve acquisition of an appropriate upland site which could be costly. Development of a nearby upland site could result in significant environmental impacts.

c. Recommended Plan. This alternative would involve deepening to -25 feet (to -27 feet including overdepth allowance) that would require dredging about 48,000 cubic yards (c.y.) of material. The deepening would be done after regular maintenance

dredging. This material would be taken by barge to the Port Townsend PSDDA openwater disposal site in the Strait of Juan de Fuca, 14 miles away. The section 404 (b)(1) evaluation specifically addresses impacts of dredged material disposal at the PSDDA site (See appendix A, part 1).

Dredging will be by clamshell into bottom-dump barge, with transport to the PSDDA openwater disposal site. The dredging operation will be conducted so as to not interfere with the State ferry which operates between Port Townsend and the Keystone Harbor ferry slip. Dredging for the deepening project is planned to take place in December 1992 and January 1993.

d. Beneficial Use of Dredged Material. Environmental agencies have proposed use of channel deepening material for clam bed enhancement and/or beach nourishment. However, the material, principally silty sands, is too fine for clam bed enhancement and marginal for beach nourishment. See main report, section 4.09 for additional discussion.

5. Environmental Consequences of the Proposed Action.

a. Sediment Quality. Dredging and placement of sediment at the PSDDA disposal site may result in a minor short-term increase in local turbidity. This is expected to be short term due to the grain size of the material (sand). No release of contaminants is expected due to the clean nature of the material, with no chemicals present in concentrations above PSDDA SL values.

b. Fish and Wildlife. No significant impacts to important fisheries resources are anticipated. As dredging will not occur between March 15 and June 15, juvenile salmonid resources will not be significantly impacted. Disposal at the PSDDA site will not seriously impact shrimp resources as it will not occur between September 1 and November 30 when peak numbers are present. During dredging and disposal, temporary disruption of feeding patterns of some aquatic organisms is expected due to increased turbidity. Dredging and disposal activities will also impact benthic organisms in the dredging area and in the immediate vicinity of the disposal (U.S. Army Corps of Engineers, et al, 1989). No long-term impacts to the aquatic habitat of the area are expected. No impact to upland wildlife is anticipated.

c. Cultural Resources. There are no known archaeological sites in the project area. The project area is located within the boundaries of the Central Whidbey Island Historic District but dredging the site will not affect any of the historic qualities of the district. See appendix B, part 2, for coordination with the Washington State Office of Archaeology and Historic Preservation and Advisory Council on Historic Preservation.

d. Water Quality. Project area water quality will not be significantly impacted by the project. Dredging and disposal will result in short-term localized increases in turbidity and decreases in dissolved oxygen. No contaminants will be released into the water column.

e. Air Quality. Some localized reductions in air quality may occur in the vicinity of the dredging and disposal sites, primarily due to exhaust emissions from the internal combustion engines of the equipment. Localized increases in noise levels may also occur. These adverse effects from noise and on air quality at the dredging and disposal sites will be short-term, intermittent, and relatively buffered from other human uses, and are not considered significant. Long-term or persistent adverse effects are not anticipated.

f. Recreational and Commercial Fishing. Compared to no-action, tug and barge traffic to and from the disposal site will have a slightly greater potential for conflicts with recreational and commercial fishing traffic at the disposal site. The site is located within usual and accustomed fishing grounds (as of 1974) of Puget Sound Indian tribes. The potential conflicts with Indian fishing activities have been addressed in the PSDDA FEIS (U.S. Army Corps of Engineers, et al, 1989), and, as appropriate project-specific actions will be taken to avoid any conflicts with tribal fishing operations no significant impacts to these operations are expected.

g. Other Resources. Minor short-term impacts on air quality and noise levels are anticipated due to operation of the dredge. Aesthetic impacts are thought to be minimal.

h. Threatened and Endangered Species.

(1) Bald Eagle. The U.S. Fish and Wildlife Service (FWS), in a planning aid letter dated March 30, 1990, indicated the only species on the Federal list of Endangered and Threatened Wildlife and Plants in the Keystone area is the bald eagle. The letter indicated that wintering bald eagles are in the vicinity between October 31 and March 31, and that nesting bald eagles are present between January 1 and August 15. The nearest bald eagle nest to the project area is about four miles away.

Bald eagles present in the vicinity of the Keystone dredging could be impacted by noise from the dredging operation and disturbance of a potential feeding area. These effects could result in avoidance of the immediate area by bald eagles. Dredging of bottom sediments may have short-term impacts on waterfowl, a food source for bald eagles. Though waterfowl in the vicinity of the navigation channel will be disturbed during the dredging activity, no long term effects are expected. Observations by local residents indicate that bald eagles rarely fly over the vicinity of the navigation channel, and are generally in transit between Lake Crockett, where they feed, and the forested hillside at Fort Casey State Park, where they perch (Hagman, 1991). Bald eagles have not been observed feeding in the navigation channel vicinity; indeed, few waterfowl use the

area, and do not provide a strong attraction for predation by eagles--thus, any temporary disturbance to waterfowl is not expected to impact bald eagles. Perching has been observed in the park during the day, but no night roosts are known in the area (Hagman, 1991). However, no night dredging is anticipated, so impacts to night roosting eagles are not expected.

The predicted sustained noise level generated by the dredge at Keystone is expected to be around 72-76 decibels (dba) at 100 feet distance, approximately the level of background noise. Furthermore, generally noise that is inconsistently produced, with punctuated peaks, such as the noise produced by a pile driver, tends to be more disturbing than sustained noise. The dredging activity would not produce punctuated noises. The nearest trees suitable for bald eagle perching are approximately 400 feet from dredging activity. According to Bottorff and Schafer's study, sustained construction noise at 400 feet attenuated somewhat to 66-69 dba. These levels fall within the background noise levels, and would not be expected to disturb perching bald eagles.

In summary, the bald eagle is not likely to be adversely impacted from dredging of the Federal navigation channel in Keystone Harbor, either in the short term or in the long term. This considers the effects on food supply, the effects of noise and human activity, and the long term effects of habitat quality.

(2) Marbled Murrelet.

(a) General. The marbled murrelet (Brachyramphus marmoratus) is proposed as a threatened species in Washington on the Federal list of Endangered and Threatened Animals and Plants (Federal Register, June 20, 1991).

Nearly all evidence to date suggests that marbled murrelets nest in old growth forests (with the exception of the Aleutian Archipelago east to the Kenai Peninsula, where there are no trees, or at least, no large trees; in that region, marbled murrelets are ground nesters) (Federal Register, June 20, 1991).

At sea, marbled murrelets feed on small fish, primarily Pacific herring (Clupea harengus), Pacific sandlance (Ammodytes hexapterus), and northern anchovy (Engraulis mordax) during the spring, summer and fall, but supplement their diet with rockfish and squid (Loligo opalescens) during the winter (Carter, 1984). They feed anywhere from close to shore in relatively shallow water out to several miles from shore in deeper water. But marbled murrelets were seldom observed in offshore habitats (waters 100-200 meters (m) deep out to the edge of the continental shelf) by Carter in his 1984 study, and apparently were most abundant in nearshore waters (defined by Carter as "protected [emphasis added] coastal waters where the surrounding shoreline is at least 3 times as long as the width of the opening to unprotected, inshore waters"). However, murrelets were seldom

observed in embayments (i.e., relatively enclosed bodies of water). This contrasts with inshore waters, which are "exposed coastal waters generally within 10 km of shore and less than 100 m deep." Thus, the ideal marbled murrelet feeding habitat appears to be relatively narrow channels that are less than 100 m deep, such as those found in parts of the San Juan Archipelago. Although Puget Sound would be considered protected waters, all the channels are much deeper than 100 m, except close to shore. Thus, one would expect to find marbled murrelets only close to shore in Puget Sound, although not in embayments such as Keystone Harbor. In addition, Carter noted that marbled murrelets are not flocking birds, but rather feed solitarily or in pairs, being distributed throughout a traditional feeding area via a mechanism Carter termed "the best possible spacing." The idea is that the birds are loosely associated with others, which reduces the need for food searching, yet the spacing reduces the competition for food. The net effect is that marbled murrelets are rarely encountered in large flocks. The areas near Keystone Harbor support small numbers of marbled murrelets, although the feeding habitat is limited.

(b) Impacts to Marbled Murrelets. Nesting habitat (old growth forest) would not be affected by this project. The noise of and activity on the operating dredge could cause marbled murrelets to avoid the area. This project would cause turbidity in the area of dredging activity, which could disturb fish upon which marbled murrelets prey. However, the disturbance is highly localized and temporary and would not be expected to adversely impact marbled murrelets, which would likely not be very near Keystone Harbor in any event. Potential impacts are diminished because of the fact that marbled murrelets are not flocking birds--whatever impacts might occur would only affect a few individuals. Furthermore, the timing of the project is such that the dredging activity would not affect either nesting or wintering birds, the two most critical times of marbled murrelet activity. This is doubly important, since marbled murrelets also molt during the period of late July to late November (individuals generally undergo molting for about 2 months during this period). During the molt, since their mobility is limited, marbled murrelets tend to find sheltered areas where they are protected from severe weather. The areas along the west shore of Whidbey Island are not generally protected from storms, and are not likely to serve as refuge areas for marbled murrelets during their molt.

i. Coastal Zone Management Act (Federal) and Shoreline Management Act (State of Washington). The project is located on lands that are leased to the State of Washington Parks and Recreation Commission by the United States for 25 years from March 21, 1976 until March 21, 2001. The lease, however, states that "The right is reserved to the United States...to make any other use of the land as may be necessary in connection with public navigation." (A portion of this land was subsequently

subleased to the Department of Transportation for Keystone ferry operations by Parks.)

The 1990 amendments to the Coastal Zone Management Act, 16 U.S.C. 1456, require that each Federal activity within or outside the coastal zone that affects any land or water use or natural resource of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved state management programs.

The amendments also require the Federal agencies to provide the state with a consistency determination in no case later than 90 days before a final approval of the Federal activity unless both the Federal agency and the state agency agree to a different schedule.

Washington State has an approved coastal zone management program, the Shoreline Management Act. The regulations implementing this Act exempt from the program Federal developments "undertaken by the federal government on lands owned in fee by the federal government, unless the federal government grants or reserves to the state or local government substantial jurdisdiction over activities on these lands." WAC 173-14-062. In light of the fact that the Federal Government owns the land in fee and has specifically reserved in the lease authority over the lands for work of the nature proposed, the State Shoreline Management Program exempts the Federal Government from the requirement to obtain a state shoreline permit. Therefore, in this regard, the activity is consistent to the maximum extent practicable with enforceable policies of the state management program.

6. Coordination with Others. In 1989 the Corps of Engineers undertook a reconnaissance study in response to a request by The Washington State Department of Transportation (WDOT) that the channel be deepened. The U.S. Fish and Wildlife Service (FWS) prepared a planning aid letter, dated March 30, 1990, based on this plan. In July 1990, a cost sharing agreement to do a feasibility study was signed by the Corps and WDOT. On November 28, 1990, an interagency meeting was held at the Seattle District office to discuss the proposed project and environmental considerations to be addressed in this EA. FWS prepared a draft and final Fish and Wildlife Coordination Act Report (see appendix B, part 3 for the final report). Coordination with PSDDA agencies on suitability of the proposed dredged material for openwater disposal was concluded in April 1991. Information was exchanged and the use of the dredged material for clam bed enhancement was discussed with staff of the Washington State Department of Fisheries on three occasions. In July 1991 the draft EA was distributed for public and agency review and comment letters were received (see appendix B, part 4). See section 5 of the main report for additional details of public and agency coordination.

7. Finding. Based on this Environmental Assessment and on coordination with local, state, and Federal agencies, it is concluded that the proposed action is not a major Federal action that will significantly impact the human environment. Consequently, an environmental impact statement is not required.

References.

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CENPS-EN-PL-ER

MEMORANDUM FOR RECORD 4 April 1991

SUBJECT: DECISION ON THE SUITABILITY OF DREDGED MATERIAL TESTED UNDER PSDDA CRITERIA FOR THE KEYSTONE HARBOR CHANNEL DEEPENING PROJECT TO BE DISPOSED OF AT THE PORT TOWNSEND PSDDA OPEN-WATER DISPOSAL SITE.

1. The following summary reflects the PSDDA agencies' (Corps, Department of Ecology, Department of Natural Resources and the Environmental Protection Agency) consensus decision on all relevant test data to make a determination of suitability of the 48,000 cubic yards of material proposed for dredging from the Keystone project site for disposal at the Port Townsend PSDDA open-water site.

2. PSDDA-approved sampling and testing protocols were followed, and quality assurance/quality control guidelines specified by PSDDA were generally complied with. The data gathered were deemed sufficient and acceptable for regulatory decision-making under the PSDDA program.

3. Seven dredged material management units in two subareas were characterized. All sediments were considered surface sediments with proposed dredging depths generally ranging between three and six feet. Subarea I was ranked high (based on a high phenol spike during previous testing), so its 24,000 cy of proposed dredged material were characterized by six analyses with no compositing. Subarea II was ranked low-moderate, and its 24,000 cy of proposed dredged material was characterized by three samples composited into one analysis.

4. Chemistry data indicated that no detected exceedances of the 1989 PSDDA screening levels (SL) occurred for any of the seven analyses. There were also no detection limits reported above SL.

5. Based on the chemistry results no bioassays were required.

6. Based on an analysis of the chemical results for the Keystone project, the reviewing PSDDA agencies concluded that all 48,000 cubic yards of proposed dredged material were suitable for unconfined open-water disposal at either a PSDDA dispersive site or nondispersive site.

Concur:

4/4/91
Date

Linda Cox
Linda Cox
Seattle District Corps of Engineers

4 April 1991
Date

David Kendall
David Kendall, Ph.D
Seattle District Corps of Engineers

4 April 1991
Date

David Fox
Seattle District Corps of Engineers

4 April 1991
Date

Justine Smith
Environmental Protection Agency, Region X

10 April 1991
Date

Russ McMillan
Washington Department of Ecology

16 April 1991
Date

Betsy Striplin
Department of Natural Resources

Copies Furnished:

DMMO file/CENPS-OP
Frank Urabeck/CENPS-EN-PL-PF
Linda Cox/CENPS-EN-PL-ER
Joanne Green/CENPS-EN-PL-PF

EPA/Justine Smith
DOE/Russ McMillan
DNR/Betsy Striplin

FINDING OF NO SIGNIFICANT IMPACT

FINAL

FINDING OF NO SIGNIFICANT IMPACT
CHANNEL DEEPENING
KEYSTONE HARBOR, WASHINGTON

Keystone Harbor, an artificial harbor constructed by the U.S. Army Corps of Engineers in 1948, is a dredged basin located on the west side of Whidbey Island four miles across Admiralty Inlet from Port Townsend on the Olympic Peninsula. The basin provides a harbor of refuge, a boat launching ramp, a 200-foot wide, 1,000 foot long, 18-foot deep navigation channel, and a terminal for the Washington State ferry between the city of Port Townsend and Whidbey Island. Ferries presently used at Keystone Harbor cannot navigate the channel safely at low tides of -2.5 MLLW or less, resulting in suspended service and extra cost to the public. Two groundings have also occurred in the recent past. These conditions have resulted in a request by the State of Washington Department of Transportation that channel deepening be studied.

An environmental assessment (EA) and Section 404 (b)(1) evaluation (appendix A) have been prepared. The proposed work consists of deepening the channel to 25 feet deep by dredging approximately 48,000 cubic yards of material with disposal of dredged materials at the Port Townsend PSDDA openwater site 14 miles to the west. The work is scheduled for December 1992 through January 1993 and will require two months to complete.

According to the EA and Section 404 (b) (1) evaluation, environmental impacts associated with the proposed dredging and disposal include minor short-term impacts to water quality due to turbidity increases, minor short-term impacts to air quality and noise levels from operation of machinery, minor short-term stress to aquatic organisms due to turbidity increases, removal of benthos from the dredged channel, burial of benthic organisms at the PSDDA disposal site, and minor short-term impacts to the esthetics of the area during disposal activities. There will be a temporary disturbance to waterfowl in the vicinity of the navigation channel. The bald eagle, a threatened species in Washington, is not expected to be affected by the proposed action, nor is the marbled murrelet, proposed as a threatened species in Washington.

Project sediments were chemically tested according to Puget Sound Dredged Disposal Analysis (PSDDA), Dredged Material Evaluation Procedures. Results indicated that all chemicals of concern were either not detected or were present in concentrations below screening levels. This means that the sediments are, according to PSDDA, considered suitable for open-water disposal.

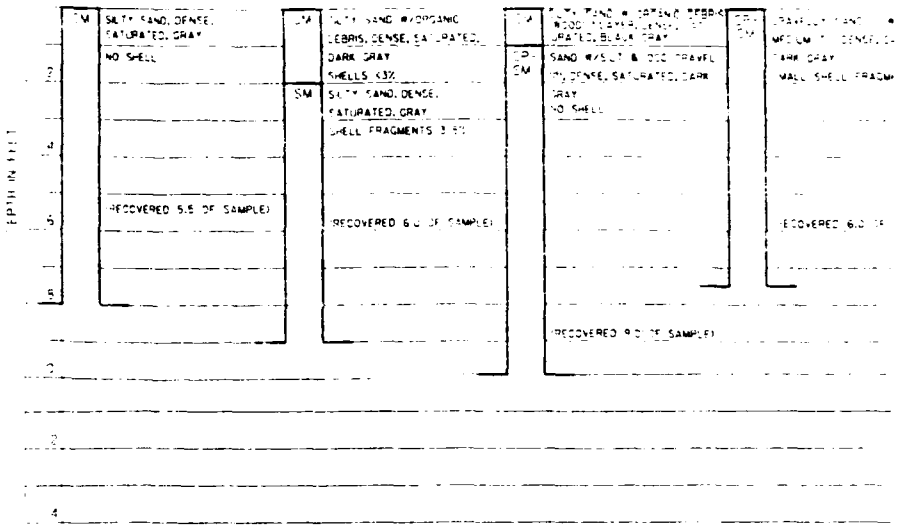
There are no known archaeological sites in the project area. The project area is located within the boundaries of the Central Whidbey island Historic District, but dredging the site will not affect any of the historic qualities of the district.

For the reasons described above, I have determined that dredging and disposal of materials from Keystone Harbor will not result in significant adverse environmental impacts. The proposed action is not a major Federal action with a significant impact on the human environment and, therefore, does not require an environmental impact statement.

2 October 1991
Date

Milton Hunter
Colonel, Corps of Engineers
District Engineer

PLATES



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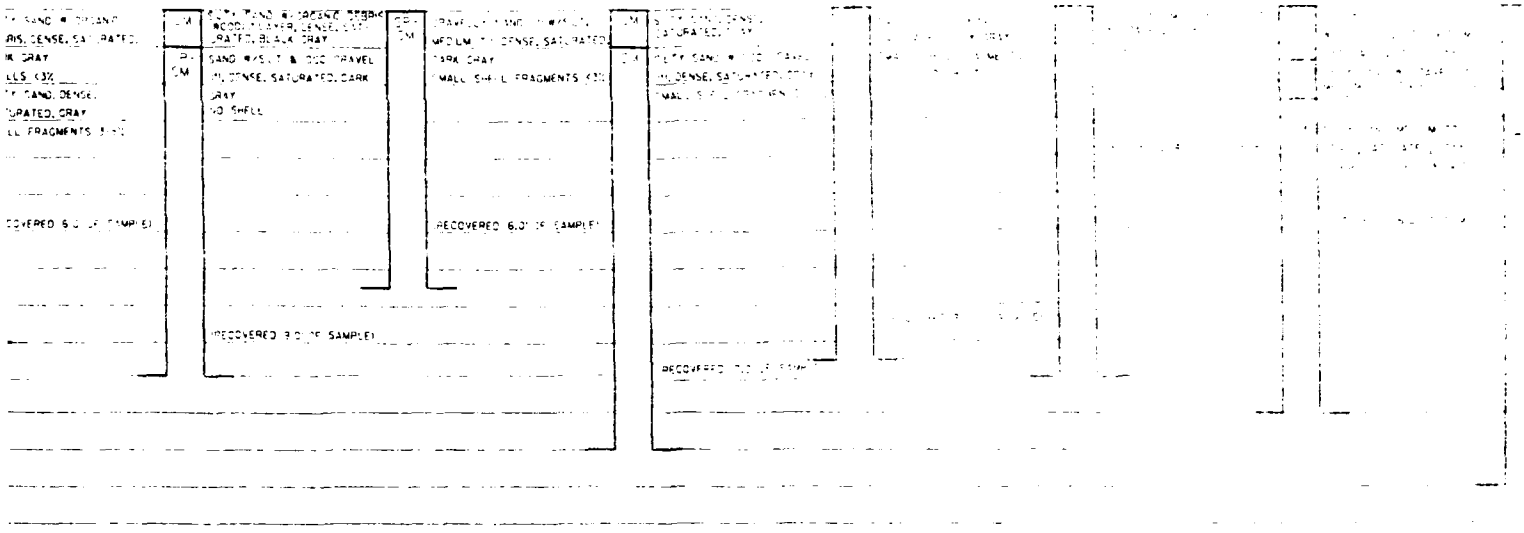

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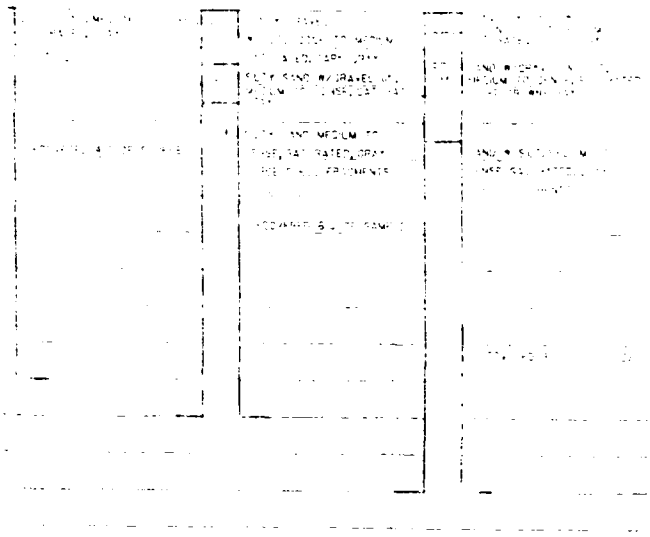


LEGEND

GP-GM	POORLY-GRADED GRAVEL W/SILT
GP	POORLY-GRADED SAND
SP-SM	POORLY-GRADED SAND W/SILT
SM	SILTY SAND

BOTTOM OF TEST HOLE

VIBRACORE TEST HOLE YEAR, NUMBER AND LOCATION

NOTES:

1. FOR TEST HOLE LOCATION SEE SHEET 2.
2. SOILS WERE VISUALLY CLASSIFIED ACCORDING TO THE "UNIFIED SOIL CLASSIFICATION SYSTEM."
3. TEST HOLE ELEVATIONS ARE TAKEN FROM TOPOGRAPHY DRAWINGS AND TIDE TABLES ARE APPROXIMATE.
4. SUBSURFACE EXPLORATION WAS CONDUCTED BY SEATTLE DISTRICT, U.S. ARMY CORPS OF ENGINEERS. TEST HOLES 90-VC-101 THROUGH 90-VC-109 WERE DRILLED ON 7 DECEMBER USING A VIBRACORE.
5. SHELL FRAGMENT QUANTITIES ESTIMATED IN PERCENT BY VOLUME.

(3)

U.S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

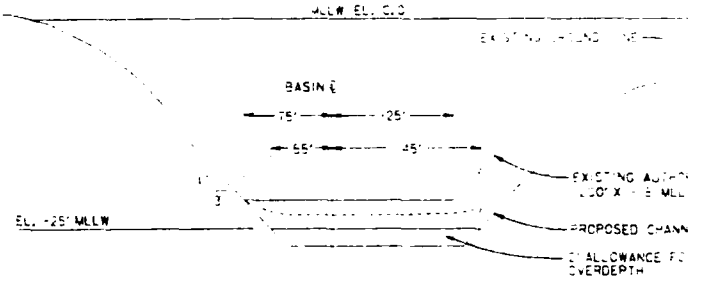
KEYSTONE HARBOR

VIBRACORE SAMPLER BORING LOGS

WASHINGTON

C-1-3-80 DEC 90 2

LAZO/POPE KAISER SHEET 1 OF 2



TYPICAL CROSS SECTION

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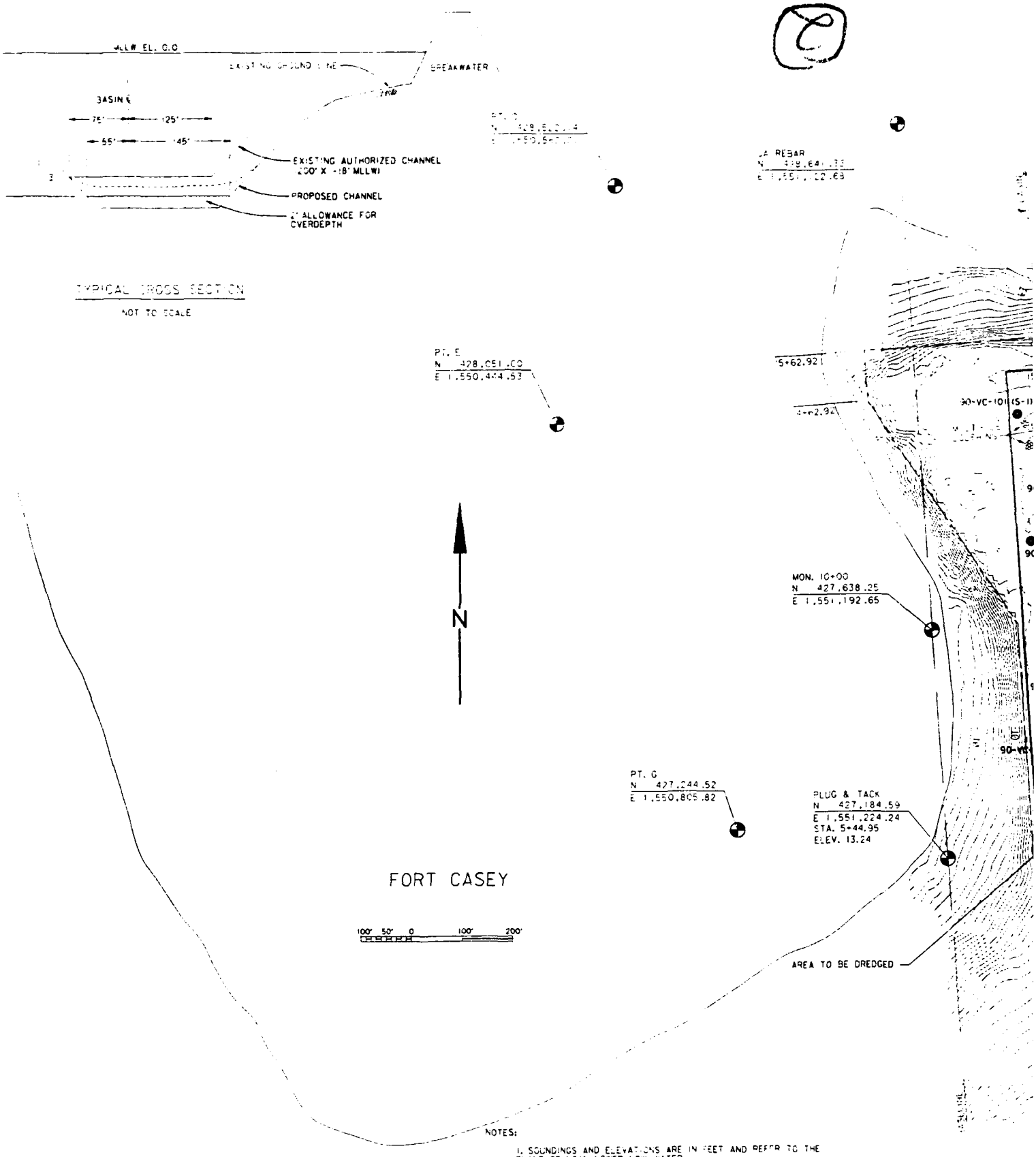


NOTES:

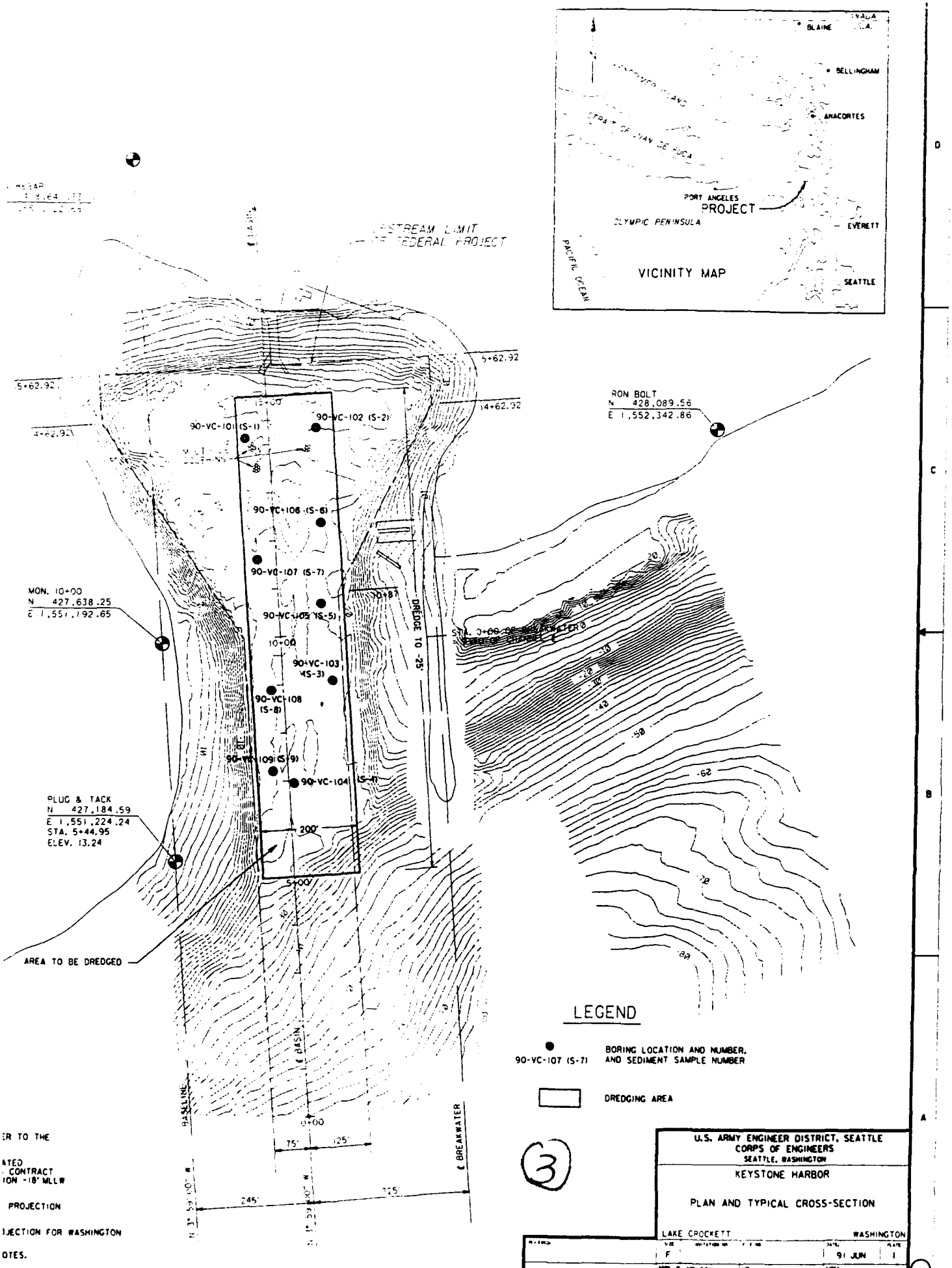
1. SOUNDINGS AND ELEVATIONS ARE IN FEET AND REFER TO THE PLANE OF MEAN LOWER LOW WATER.

2. THE CONDITION PRESENTED REPRESENTS THE ESTIMATED CONDITION TO BE ENCOUNTERED AT THE TIME OF THIS CONTRACT AFTER MAINTENANCE DREDGING BY OTHERS TO ELEVATION -18' MLLW PLUS OVERDEPTH.

3. AZIMUTH ON CENTERLINE OF CHANNEL ARE LAMBERT PROJECTION AND DIFFER FROM TRUE NORTH AZIMUTH BEARINGS.

4. HORIZONTAL CONTROL BASED ON LAMBERT GRID PROJECTION FOR WASHINGTON NORTH ZONE.

5. SEE PLATE 2 FOR BORING LOGS, AND ADDITIONAL NOTES.



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U.S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

KEYSTONE HARBOR

PLAN AND TYPICAL CROSS-SECTION

LAKE CROCKETT WASHINGTON

	F	91 JUN	1
	E. NELSON		

U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

KEYSTONE HARBOR

DESIGN AND CONSTRUCTION SCHEDULE

LAKE CROCKETT WASHINGTON

SIZE	IDENTIFICATION NO.	FILE NO.	DATE	PLATE
			91 SEPT 20	3
DESIGN Nelson	DRAWN Green		SHEET	

APPENDICES

APPENDIX A

Part 1 - Section 404(b)(1) Evaluation

Part 2 - Public Notice

APPENDIX A - PART 1

SECTION 404(b)(1) EVALUATION

APPENDIX A PART 1

FINAL
SECTION 404(b)(1) EVALUATION
CHANNEL DEEPENING
KEYSTONE HARBOR, WASHINGTON

1. Introduction. The accompanying environmental assessment (EA) describes the impacts of the proposed disposal of sediments from deepening the Keystone Harbor project at Keystone, Washington. The following evaluation was prepared pursuant to Section 404(b)(1) of the Clean Water Act in accordance with guidelines promulgated by the Environmental Protection Agency (40 CFR 230) for evaluation of the discharge of dredged material into waters of the United States. References to the EA for this action will be made throughout this 404 evaluation. A key reference used in preparation of this evaluation was the PSDDA FEIS, Unconfined Openwater Disposal of Dredged Material, Phase II (North and South Puget Sound) (U.S. Army Corps of Engineers, et al, 1989).

2. Description of Proposed Discharge.

2.1 Need for Discharge. See section 2 of the EA.

2.2 Location. The Port Townsend PSDDA openwater disposal site is located in the Strait of Juan de Fuca at Lat. 48 deg. 13.62 min. N., Long. 122 deg. 58.95 min. W. (1927 NAD), approximately 14 nautical miles west of Keystone Harbor. See main report, figure 1-1.

2.3 Description of Discharge Site. The Port Townsend dispersive site has a bottom depth of approximately 361 feet and an area of 884 acres.

2.4 Method of Discharge. Dredged material will be taken to the Port Townsend PSDDA disposal site and discharged by means of bottom dump barge.

2.5 Disposal Schedule. Dredging is scheduled to occur in December 1992 through January 1993. This time period avoids peak periods of juvenile salmonid migration and shrimp activity at the PSDDA disposal site. Dredging and disposal operations will require 20 to 30 working days. No work will be conducted for the period 15 March through 15 June.

2.6 General Characteristics of Material. Sediment to be dredged consists of bottom sediments of silty sand, gravelly sand, and silty sand with gravel (1" minus). Shell composition averages 3 percent by volume.

2.7 Quantity of Material. The proposed project would discharge approximately 48,000 cubic yards of material.

2.8 Source of Material. Material is to be dredged from the bottom of the Keystone Harbor channel (see Plate 1 following EA).

3. Potential Impacts and Chemical Characteristics of the Aquatic Ecosystem.

3.1 Substrate. The channel material consists of silty sands and gravelly sands with shell fragments.

3.2 Water Quality. Only temporary reductions in water quality at and around the disposal sites are expected during disposal operations. These include minor depression of dissolved oxygen, short-term increases in turbidity, and insignificant release of organic matter and sediment-associated chemicals of concern. These effects will be primarily associated with the disposal plume. These adverse effects to water quality will be minor and temporary, with rapid dilution of dispersion subsequent to disposal. Significant or unacceptable effects are not anticipated. The quality of sediments at the disposal site will not be significantly affected by disposal of project sediments. State water quality standards (WAC 173-201) will be met. In summary, adverse effects on water quality and biota from dredged material chemicals are not expected to be significant.

3.3 Current Patterns and Water Circulation. The proposed dredging and disposal will have no impact on the project area current patterns or water circulation.

3.4 Normal Water Fluctuations. The proposed dredging and disposal will have no impact on normal tidal patterns.

3.5 Salinity Gradients. The proposed dredging and disposal will have no impact on salinity gradients.

4. Potential Impacts on Biological Characteristics of the Aquatic Ecosystem.

4.1 Threatened and Endangered Species. No threatened or endangered species are expected to be impacted by the project disposal activities (U.S. Army Corps of Engineers, et al, 1989).

4.2 Aquatic Food Web. Impacts of disposal at PSDDA approved sites are addressed in the PSDDA FEIS (U.S. Army Corps of Engineers, et al, 1989). Portions of the disposal site will be physically impacted by the discharging of dredged material. During this physical disruption, the impacted area will be temporarily removed from benthic production. These losses should not be significant, as the sites have been located and would be managed to minimize adverse effects on significant biological resources. Tidal energetics will prevent material from accumulating and local physical effects will be minimized by

requiring the tug and barge to continue moving during the dump, further spreading the material. Relatively little burial of benthic, sessile organisms is expected to occur due to its size, the energetic current transport mechanisms, the "spread out" means of disposal, and the relatively small amount of material that is destined for disposal. Epifaunal species (principally shrimp) could be physically affected by falling or current-borne material and by suspended particles and associated respiratory problems. These impacts would be transitory and not significant due to the low chemical levels of the dredged material, the small volume of dredged material to be placed at the site, and the seasonal site use restriction (1 September through 30 November) that would avoid peak shrimp populations.

4.3 Wildlife. Disposal activities, with barge and tug passage and associated noise, will displace birds found at the disposal site during the very short time of individual disposal operations. Though much less common, any marine mammals found in the area will also be temporarily displaced. Given the existing level of navigation traffic found at and near the sites, this temporary displacement is not expected to result in significant effects to these species.

5. Potential Impacts on Special Aquatic Sites. Proposed action will have no impact on any special aquatic sites - mudflats and eelgrass beds - localized in the project vicinity.

6. Potential Effects on Human Use Characteristics.

6.1 Recreational and Commercial Fisheries. Compared to no-action, tug and barge traffic to and from the disposal sites will have a slightly greater potential for conflicts with recreational and commercial fishing traffic at the disposal site. The site is located within usual and accustomed fishing grounds (as of 1974) of Puget Sound Indian tribes. The potential conflicts with Indian fishing activities have been addressed in the PSDDA FEIS (U.S. Army Corps of Engineers, et al, 1989), and, as appropriate project-specific actions will be taken to avoid any conflicts with tribal fishing operations no significant impacts to these operations are expected.

6.2 Water Related Recreation. No impact to recreational boating or use of the nearby underwater park is anticipated.

6.3 Esthetics. The disposal activity is not expected to significantly affect area esthetic values.

6.4 Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves. The dredging site is located within Ft. Casey Sate Park (State of Washington). Dredging will follow the close of the camping season and will not adversely impact the park. An underwater park (State of Washington) is located in the vicinity and will not be adversely impacted by the proposed action.

7. Evaluation and Testing of Discharge Material.

7.1 General Evaluation of Dredged or Fill Material. The sediments consists primarily of medium to dense silty sands in the northern portion of the dredging site and a loose to medium gravelly sand layer on top of medium to dense silty sand with gravel in the southern portion of the site.

7.2 Evaluation of Chemical-Biological Interactive Effects.

7.2.1 Exclusion of Material from Testing. Sediments were not excluded but were chemically tested according to PSDDA evaluation procedures. Results indicated that all chemicals of concern were either not detected or were present in concentrations below screening levels. This means that the sediments are, according to PSDDA criteria, considered suitable for open-water disposal.

7.2.2 Water Column Effects. Rapid settling of discharged material is expected, resulting in no significant water column effects.

7.2.3 Effects on Benthos. Refer to Section 4.3 above. As the sediments are considered acceptable for disposal at the Port Townsend site, no significant interactive effects on disposal area benthos is anticipated.

7.3 Comparison of Excavation and Discharge Sites. The dredging site contains sand and gravel which have been tested and found to contain no chemicals above PSDDA screening levels. The Port Townsend disposal site is composed of relatively uncontaminated fine sand and silt.

7.3.1 Total Sediment Chemical Analysis. Refer to Section 7.2.1. See attached sediment test data (Appendix 3).

7.3.2 Biological Community Structure Analysis. A community structure analysis was not considered necessary and was not performed.

7.4 Physical Tests and Evaluations. Refer to Section 7.1. Sediments are expected to settle to the bottom at a rapid rate.

8. Factual Determinations.

8.1 Physical Substrate Determinations. The dredged material will have minimal impact on disposal area substrate.

8.2 Water Circulation, Fluctuation, and Salinity Determinations. The disposal is not expected to impact these parameters.

8.3 Suspended Particulate/Turbidity Determinations. Turbidity increases due to the proposed discharge will be minimal and short lived.

8.4 Contaminants Determinations. The material to be dredged is acceptable for open-water disposal as it contains no chemicals of concern that are above PSDDA screening levels.

8.5 Aquatic Ecosystem and Organism Determinations. The dredging and disposal activities are not expected to significantly impact the Keystone Harbor area/Port Townsend disposal site ecosystems.

8.6 Proposed Disposal Site Mixing Zone Determinations. Not applicable as the Port Townsend disposal site is a dispersive site.

8.7 Determination of Cumulative Effects on the Aquatic Ecosystem. The proposed action will not significantly impact the Keystone Harbor or Port Townsend disposal site aquatic ecosystem and will not contribute significantly to cumulative affects on these ecosystems from other activities.

8.8 Determination of Secondary Effects on the Aquatic Ecosystem. No significant secondary effects on the project vicinity aquatic ecosystem are anticipated from the proposed disposal.

9. Proposed and Alternative Actions to Minimize Adverse Effects. Disposal will not occur from 1 September through 30 November so that peak shrimp populations will not be significantly impacted. Also, disposal will not occur during 15 March through 15 June to avoid fisheries impacts. Material will be placed at a PSDDA open-water site under criteria established by PSDDA guidelines.

10. Analysis of Practicable Alternatives.

10.1 Identification and Evaluation of Practicable Alternatives. Onsite alternatives include no action and upland disposal of all dredged material. No action would preserve the environmental status quo of the area. Upland disposal would involve rehandling to load the dredged material onto trucks for transport to an undesignated upland site. Acquisition of such a site would be difficult due to large size (acreage) requirements and high costs. Logistically, the option is viable, and the technology exists to prepare such a site. But the costs of obtaining the site and the costs of monitoring ground water and other pertinent ecological parameters lead to the conclusion that this alternative is not practicable. Selection of the Port Townsend PSDDA site is appropriate as it is the closest approved site to Keystone Harbor. Thus, in consideration of cost, logistics, and technology, there is no practicable alternative to the proposed project that would have less impact on the human environment and would meet project requirements.

10.2 Evaluation of Alternatives to Discharge in Special Aquatic Sites. Proposed action is not expected to have any impact on any special aquatic sites as described.

11. Review of Conditions for Compliance.

11.1 Availability of Practicable Alternatives. See EA, section 4. In terms of cost, logistics and technology, the proposed project is the only practicable alternative that will fulfill project objectives and have minimal adverse impact on the aquatic ecosystem.

11.2 Compliance with Pertinent Legislation.

11.2.1 State Water Quality Standards and Federal Toxic Effluent Standards (Section 307 of the Clean Water Act). The proposed discharge will comply with all applicable state water quality and Federal toxic effluent standards. State of Washington water quality certification was received for this project.

11.2.2 Threatened and Endangered Species (Endangered Species Act of 1973). No threatened or endangered species will be adversely affected by the proposed action (See EA, paragraph 5).

11.2.3 Marine Sanctuaries (Marine Protection, Research, and Sanctuaries Act of 1977). No marine sanctuaries are located in the vicinity of the proposed action.

11.3 Potential for Significant Degradation of Water as a Result of the Discharge of Polluted Material. Water quality will not be significantly degraded by disposal of project area sediments.

11.4 Steps to Minimize Potential Adverse Impacts on the Aquatic Ecosystem. Disposal will not occur from 1 September through 30 November so that peak shrimp populations will not be significantly impacted. Also, disposal will not occur during 15 March through 15 June to avoid fisheries impacts. Material will be placed at a PSDDA open-water site under criteria established by PSDDA guidelines.

12. Findings. The discharge of dredged material for the dredging of the Keystone Harbor Channel and discharging of this material at the Port Townsend open-water site complies with the Section 404(b)(1) guidelines.

2 October 1991
Date

Milton Hunter
Colonel, Corps of Engineers
District Engineer

APPENDIX A - PART 2

PUBLIC NOTICE

Public Notice

US Army Corps of Engineers
Seattle District
CENPS-EN-PL-CP

Public Notice Date: 11 June 1992
Expiration Date: 26 June 1992
Reference: CENPS-EN-PL-CP-01
Name: Seattle District,
Corps of Engineers

U.S. ARMY CORPS OF ENGINEERS CHANNEL DEEPENING AND MAINTENANCE DREDGING, KEYSTONE HARBOR, ADMIRALTY INLET, WA

1. PURPOSE. Interested parties are hereby notified that the Seattle District, U.S. Army Corps of Engineers (Corps) proposes to perform periodic maintenance dredging and deepen the Federal navigation channel at Keystone Harbor, Admiralty Inlet, Washington.

2. APPLICABLE LAWS. This public notice is being issued in accordance with the rules and regulations published as 33 CFR 335 "Operation and Maintenance of Army Corps of Engineers Civil Works Projects Involving the Discharge of Dredged or Fill Material into Waters of the U.S. or Ocean Waters;" 33 CFR 336 "Factors to be Considered in Evaluation of Army Corps of Engineers Dredging Projects Involving the Discharge of Dredged Materials into Waters of the U.S. and Ocean Waters;" 33 CFR 337 "Practice and Procedure;" and 33 CFR 338 "Other Corps Activities Involving the Discharge of Dredged Material or Fill into Waters of the U.S." The location of the proposed dredging and disposal sites is shown on the enclosed drawing, see enclosure 1.

The proposed dredging and disposal activities have been reviewed in accordance with Section 10 of the Rivers and Harbors Act of 1899; Section 313 of the Clean Water Act of 1977 (33 U.S.C. 1323, 86 Stat. 816); Section 404 of the same Act (33 U.S.C. 1344); Section 307(c)(1) and (2) of the Coastal Zone Management Act of 1972 (16 U.S.C. 1456(c)(1) and (2), 86 Stat. 1280), the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347); the Fish and Wildlife Coordination Act of 1956 (16 U.S.C. 661-666c); the Endangered Species Act of 1973 (16 U.S.C. 668a-668cc-6, 87 Stat. 884); the National Historic Preservation Act of 1966 (16 U.S.C. 470, 80 Stat. 915).

3. AUTHORIZED PROJECT. The Keystone Harbor project and maintenance dredging by the Department of the Army were authorized by the Rivers and Harbor Act of March 2, 1925 (House Document 303, 77th Congress, 1st Session). The authorized project provides for a mooring basin with an area of about 6 acres and a depth of -18 feet mean lower low water (MLLW), connected to Admiralty Bay by a 200-foot-wide navigation channel of the same depth. The mooring basin and navigation channel are protected by a breakwater. Maintenance dredging of the entrance channel has been required approximately every 4 to 6 years and was last completed in 1987.

4. LOCAL INTEREST. The Washington State Department of Transportation (WSDOT) operates a ferry to Port Townsend from the head of the navigation channel. By letter dated 21 September 1988, WSDOT requested that the Corps initiate a study to deepen the navigation channel to accommodate larger ferries necessary to handle increased traffic demand. WSDOT has agreed to be the local sponsor for the proposed channel deepening. WSDOT's request resulted in a Final Definite Project Report/Environmental Assessment (DPR/EA) which was approved by Headquarters, Corps on 16 January 1992. The DPR/EA, available for inspection in the Seattle District Office, revises the authorized channel from a depth of -18 feet MLLW to a depth of -25 feet MLLW. Deepening of the navigation channel is not expected to increase the maintenance dredging requirements of the project.

5. PROPOSED WORK. The proposed work consists of two components, i.e., routine maintenance (O&M) dredging and channel deepening dredging. The O&M material is littoral drift material composed of sandy gravel with cobbles up to 6 inches and is estimated to be approximately 25,000 cubic yards (CY). This material collects along the west side of the navigation channel down to elevation -19 MLLW, i.e., -18 authorized depth plus 1 foot tolerance, as shown on the enclosed drawing. The channel deepening material is native fine grained silty sands from the channel bottom and is estimated to be approximately 30,000 CY for a total dredging quantity of about 55,000 CY. The channel deepening material consists of all material between elevation -19 and -26 MLLW, i.e., -25 authorized depth plus 1 foot tolerance. The dredging and disposal is proposed to occur between September and March, and is within the season preferred by Federal and State resource agencies. The work will not affect the use of the recreational facilities at Fort Casey State Park or interrupt operation of the ferries.

5.1. O&M Dredging - Dredging of maintenance material is expected to be accomplished by a dragline or clamshell into truck or barge, or by hydraulic dredge with discharge at the disposal site. Disposal of this material is proposed as beach nourishment to replenish the eroded beachline east of the jetty as shown on the enclosed drawing, enclosure 1. The disposal site is owned by the Department of the Army and leased by the State of Washington for use as a recreation area.

With either dredging method the historical limits of the fill will be observed. The toe of the fill will extend to the -5 foot MLLW contour. The jetty, adjacent underwater park, and the abandoned wharf will be protected by tapering the fill away from them.

If dredging is by clamshell or dragline into trucks, the beach adjacent to the shoal area may be disturbed during the material rehandling operation. In this event the beach will be restored after the operation is completed.

If dredging is by clamshell into a barge, some minor dredging and pile driving may be necessary to construct a temporary dock to offload the barges as shown on enclosure 1. The temporary construction will be removed after the dredging operation and the beach restored.

If the dredging is by hydraulic dredge, operations will be conducted as in 1976. Existing beach gravel will be pushed out to form a berm at the toe of the fill and the dredged material will be pumped into the ends of the resulting trench. Effluent will exit at the center of the berm.

5.2. Channel Deepening Dredging - Deepening of the channel will be accomplished by clamshell dredge and bottom-dump barge. Environmental testing of sediments was conducted under Puget Sound Dredge Disposal Analysis (PSDDA) guidelines and the proposed dredged material was approved for disposal at the Washington State Department of Natural Resources Port Townsend PSDDA open-water disposal site. Open-water disposal at the PSDDA site will not begin prior to 1 December to avoid the closure for shrimp and will be in accordance with criteria established for disposal at the site. The open-water site and criteria for disposal at the site was established by the Seattle District, Corps; U.S. Environmental Protection Agency, Region X; and the State of Washington Departments of Natural Resources and Ecology. Details are in the following PSDDA documents available for inspection in the Seattle District Office:

* Management Plan Report - Unconfined Open-Water Disposal of Dredged Material, Phase II (Puget Sound North-South), June 1988.

* Disposal Site Selection Technical Appendix (DSSTA).

* Evaluation Procedures Technical Appendix (EPTA).

* Management Plans Technical Appendix (MPTA).

* Final Environmental Impact Statement (NEPA/SEPA) Unconfined, Open-Water Disposal Sites for Dredged Material, Phase II, (Puget Sound North-South).

6. ENVIRONMENTAL INVESTIGATIONS.

6.1. O&M Dredging - An Environmental Assessment (EA) and Section 404(b)(1) Evaluation for maintenance dredging was distributed for public review on 7 January 1980. Public comments were received and incorporated and the EA was finalized on 8 April 1980. The Seattle District is currently updating the EA and Section 404(b)(1) Evaluation for this maintenance dredging. A copy of the EA is available at the District Office.

6.2. Channel Deepening Dredging - An EA for the channel deepening was prepared by Seattle District and distributed for public and agency review in June 1991 and a public meeting was held. No opposition to the project was expressed during the review period. The DPR/EA contains a Section 401(b)(1) Evaluation.

6.3. Threatened Species - Biological assessments were prepared for the bald eagle, listed as "threatened" under the Endangered Species Act of 1973, and the marbled murrelet, proposed for listing as "threatened." The 1991 EA concluded that the dredging activity will not affect either species or their critical habitat. Formal consultation under Section 7 of the Act is not required.

6.4. Historical Sites - There are no known archaeological sites in the project area. The project is located within the Central Whidbey Island Historic District, but dredging of the site will not effect the historic qualities of the District. This public notice has been provided to the Washington State Historic Preservation Officer.

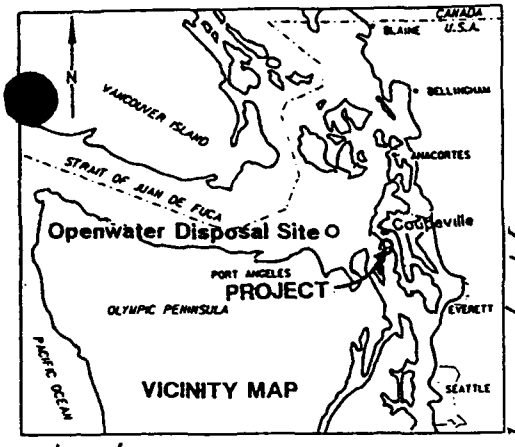
7. COASTAL ZONE MANAGEMENT AGREEMENT. The proposed work is consistent to the maximum practicable extent with the State of Washington Coastal Zone Management Program.

8. DECISION FACTORS. The decision to allow this activity will be based on an evaluation of the probable impact of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered; among those are conservation, economics, esthetics, general environmental concerns, historic values, fish and wildlife values, flood damage prevention, land use, navigation, recreation, water supply, water quality, energy needs, safety, food production and, in general, the needs and welfare of the people.

9. PUBLIC RESPONSE. Replies to this public notice should be mailed to reach the District Engineer, ATTN: CENPS-EN-PL-CP, Post Office Box 3755, Seattle, Washington 98124-2255, not later than the closing date of this notice to assure consideration. Telephone inquiries should be directed to Larry Scudder, Project Manager, (206) 764-6568 or to Alex Sumeri, (206) 764-3402.

Any person who has an interest which may be affected by the disposal of this dredged material may request a public hearing. The request must be submitted in writing to the District Engineer within 15 days of the issue date of this notice, and must clearly set forth the interest which may be affected and the manner in which the interest may be affected by this activity. Comments should refer to the notice number shown above.

Drawing



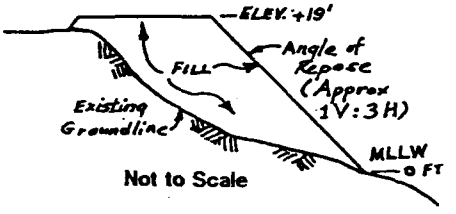
PROPOSED WORK: 1) Maintenance Dredging: By hydraulic or clamshell dredge, remove approx. 25,000 c.y. of shoaled sandy gravel with cobbles and dispose at upland site for beach nourishment.

2) Channel Deepening: By clamshell dredge, remove approx. 30,000 c.y. of silty sand, transport by bottom dump barge to the Port Townsend PSDDA openwater disposal site.

Project: Lat 48° 09' 30" Long 122° 40' 20"
3 mi South of Coupeville.

PSDDA Disposal Site:
Lat 48° 13.61'
Long 122° 59.03'
(1983 NAD)

TYPICAL UPLAND DISPOSAL CROSS SECTION



Not to Scale

TYPICAL DREDGING CROSS SECTION

Not to Scale

PURPOSE: MAINTENANCE DREDGING AND CHANNEL DEEPENING

DATUM: MLLW = 0 FT

ADJACENT PROPERTY OWNERS:

① Leased by U.S. Govt to State of Washington for a State Park; subleased to State Dept of Transportation for Ferry Operations.

NPS-EN-PL-CP-01

IN KEYSTONE HARBOR, ADMIRALTY INLET

AT WHIDBEY ISLAND

COUNTY OF ISLAND STATE WASH

WORK BY US ARMY CORPS OF ENGINEERS, SEATTLE DIST

SHEET 1 OF 1 **20 May 1992**

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Mail Stop PV-11 • Olympia, Washington 98504-8711 • (206) 459-6000

June 11, 1992

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Notice of Application for
Water Quality Certification

Notice is hereby given that a request is being filed with the Department of Ecology for certification, that a proposed discharge resulting from the project described in the Corps of Engineers Public Notice No. CENPS-EN-PL-CP-01 will comply with the applicable provisions of State and Federal Water Pollution Laws.

Any person desiring to present views on the project pertaining to water pollution may do so by providing written comments to the Corps Permit Coordinator, Department of Ecology, Operations Office, Mail Stop PV-11, Olympia, Washington 98504.

Please note, state regulation requires a minimum of 20 days of public notice. The comment period will begin June 11, 1992 (date of publication) and run until final comments are received from reviewing state agencies and the local government(s).

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

Mail Stop PV-11 • Olympia, Washington 98504-8711 • (206) 459-6000

September 11, 1992

District Engineer
Department of the Army
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

ATTN: Alex Sumeri and Lester Soule
Navigation Branch

RE: Corps Public Notice No. CENPS-EN-PL-CP-01
Keystone Harbor Maintenance Dredging and Deepening

Dear Corps:

Your public notice to authorize the above referenced permit has been reviewed in accordance with all pertinent rules and regulations. The proposed activity entails maintenance dredging and channel deepening within Keystone Harbor. The maintenance material will be placed as beach nourishment. The material from channel deepening will be disposed at the Port Townsend PSDDA disposal site.

On behalf of the State of Washington, we certify that the work proposed under this permit comply with applicable provisions of Sections 301, 302 303, 306 and 307 of the Federal Clean Water Act as amended. This certification does not authorize hydraulic dredging for the material that will be disposed at the Port Townsend PSDDA site. This certification is subject to the conditions stipulated by the Washington Department of Fisheries in the enclosed HPA and the following:

GENERAL

1. Water quality standards pertaining to the marine waters of Keystone Harbor (Class AA) shall apply to this project except in the authorized dilution zone, which in this case shall extend 150 feet radially and 300 feet downcurrent from the point of dredging. Within the dilution zone, dissolved oxygen levels shall not be caused to drop below 5.0 mg/l.

2. Both floatable and non-floatable debris of significant size shall be removed from the dredged material prior to disposal at the PSDDA or beach sites. All debris shall be disposed of at an upland location.

3. Care shall be taken to prevent any petroleum products or other deleterious or toxic materials from entering the water. If a significant oil sheen or distressed or dying fish are observed in the vicinity of dredging, the operator shall cease immediately and notify the department of such condition. Contact the Northwest Regional Office at (206) 649-7000.

4. The department shall be notified at least seven days prior to the start of dredging. Contact Sandra Manning at 438-7514.

CHANNEL DEEPENING

5. The 30,000 cys of subsurface sediment to be dredged for channel deepening, was sampled and analyzed according to procedures prescribed by the Puget Sound Dredge Disposal Analysis (PSDDA) program and was found to be acceptable for disposal at the Port Townsend PSDDA disposal site.

6. Sediment characterization under PSDDA is considered valid for a period of two years from the date of sampling (April 4, 1991); provided, however, the area is not subjected to a changed condition or new source of contamination prior to the start of dredging.

7. Subsequent dredging and disposal of sediments from the site will be subject to the Recency and Frequency guidelines of PSDDA, if PSDDA disposal is to be continued.

8. Unconfined in-water disposal of the channel deepening material is authorized only within the bottom dilution zone prescribed by PSDDA for the Port Townsend disposal site.

9. Disposal of dredged material at the PSDDA site shall be by bottom dump scow only, unless another disposal method is approved by the PSDDA agencies.

MAINTENANCE DREDGING

10. Disposal of the maintenance material is authorized only within the eroded beach area east of the existing jetty, landward of the 0.00 tide elevation as illustrated in the drawings attached to the public notice.

11. Beach nourishment operations will be as described in the public notice for hydraulic dredging. The work will entail pushing existing beach gravel out to form a berm at the toe of the fill. Dredged material will be pumped into the ends of the resulting trench. Effluent will exit at the center of the berm.

12. For the beach nourishment disposal site, water quality standards for class AA waters shall be maintained for the surrounding waters, except for in the authorized dilution zone, which in this case shall extend 150 feet waterward of the 0.00 tide elevation. Within the dilution zone dissolved olygen shall not be caused to drop below 5.0 mg/L.

Outside of the dilution zone, turbidity levels shall not exceed 5 NTU's above background. If turbidity levels are exceeded, the disposal shall stop, and silt curtains shall be placed to control sediment from entering adjacent waters.

Please note this certification does not exempt, and is provisional upon, compliance with other statutes and codes administered by federal, state and local agencies.

If you have any questions about this certification, please contact Sandra Manning at (206) 438-7514.

Sincerely,

M. F. Palko
Supervisor
Environmental Review

MFP: slm

cc: Corps, Linda Cox (by fax)
WDF, Brian Williams
WDW, Ginna Correa
EPA, Justine Smith
USF&WS, Dawn Whitehead

APPENDIX B

STUDY COORDINATION AND PUBLIC INVOLVEMENT

Part 1 - Coordination and Public Involvement

Part 2 - Coordination Letters

Part 3 - Fish and Wildlife Coordination Act Report and Corps of Engineers Responses

Part 4 - Comments and Responses

APPENDIX B - PART 1

COORDINATION AND PUBLIC INVOLVEMENT

DEPARTMENT OF FISHERIES

HYDRAULIC PROJECT APPROVAL

R.C.W. 75.20.100
R.C.W. 75.20.103

[4] June 25, 1992
(applicant should refer to this date in all correspondence)

DEPARTMENT OF FISHERIES
General Administration Bldg.
Olympia, Washington 98504
(206) 753-6650

[10] LAST NAME: Army Corps of Engineers	FIRST	[18] CONTACT PHONE(S): (206) 764-6568	[1] CONTROL NUMBER: CE-NPSEN-01
[19] STREET OR RURAL ROUTE: Post Office Box 3755, ATTN: Larry Scudder			[7] [8] [9] WRIA: 06.MARI
CITY: Seattle	STATE: WA	ZIP: 98124	[14] [17]
[12] WATER: Admiralty Inlet	TRIBUTARY TO: Puget Sound		[11] TYPE OF PROJECT: Maintenance Dredge
[13] QUARTER SECTION	SECTION: 22	TOWNSHIP: 31N	RANGE(E-W): 01E COUNTY: Island

TIME LIMITATIONS: [5] THIS PROJECT MAY BEGIN: Immediately — [6] AND MUST BE COMPLETED BY: March 14, 1993

THIS APPROVAL IS TO BE AVAILABLE ON THE JOB SITE AT ALL TIMES AND ITS PROVISIONS FOLLOWED BY THE PERMITTEE AND OPERATOR PERFORMING THE WORK.

SEE IMPORTANT GENERAL PROVISIONS ON REVERSE SIDE OF APPROVAL

NOTE: The Department of Fisheries has reviewed your plans appearing in Corps of Engineers Public Notice CENPS-EN-PL-CP-01, received on June 15, 1992.

1. This project is approved as illustrated in your application subject to the following provisions.
2. The applicant or contractor shall notify the Regional Habitat Manager listed below by phone at least seven (7) working days prior to the start of construction activities.
3. Dredging and disposal below the ordinary high waterline shall not occur from March 15 through June 14 of any year for the protection of migrating juvenile salmonids.
4. In addition, open water disposal of dredge materials at the Port Townsend PSDDA site shall not occur from September 1 through November 30 of any year for protection of pandalid shrimp.
5. If a hydraulic dredge is used, it shall only be operated with the intake at or below the surface of the material being removed. The intake shall only be raised a maximum of three (3) feet above the bed for brief periods of purging or flushing the intake system.
6. A floating clamshell may be used for dredging. Each pass of the clamshell bucket shall be complete, and there is to be no stockpiling in the water.

SEPA: Exempt
REGIONAL HABITAT MANAGER - Brian Williams (206) 339-3881
PATROL - Nelson
APPLICANT - WILDLIFE - READER - PATROL - HAB. MGR. - WRIA

DEPARTMENT OF FISHERIES R Jamieby Flint for **DIRECTOR**

DEPARTMENT OF FISHERIES

HYDRAULIC PROJECT APPROVAL

R.C.W. 75.20.100
R.C.W. 75.20.103

[4] June 25, 1992
(applicant should refer to this date in all correspondence)

DEPARTMENT OF FISHERIES
General Administration Bldg.
Olympia, Washington 98504
(206) 753-6650

[10] LAST NAME	[18] CONTACT PHONE(S)	[1] CONTROL NUMBER
Army Corps of Engineers	(206) 764-6568	CE-NPSEN-01
[12] WATER Admiralty Inlet		[9] WRIA 06.MARI

7. Dredging operations shall be conducted at all times in a manner to cause little or no disturbance or siltation to the adjacent waters.

8. If a fish kill occurs or fish are observed in distress, the project activity shall immediately cease and WDF Habitat Management Division shall be notified immediately.

9. Dredged materials shall be deposited at an approved, designated Department of Natural Resources deep water disposal site or shall be placed at the approved upland/beach disposal site east of the Keystone Harbor breakwater as illustrated.

10. Dredged materials placed at the approved upland/beach disposal site east of the Keystone Harbor breakwater shall not be placed waterward of the 0.00 tide elevation (MLLW = 0.00) as illustrated.

11. Project activities shall be conducted to minimize siltation of beach areas and bed materials.

12. If a fish kill occurs or fish are observed in distress, the project activity shall immediately cease and WDF Habitat Management Division shall be notified immediately.

13. Debris or deleterious material resulting from construction shall be removed from the beach area and project site and shall not be allowed to enter waters of the state.

14. Water quality is not to be degraded to the detriment of fish life as a result of this project.

If you have any questions or need additional information, please contact Brian Williams, Regional Habitat Manager, at (206) 339-3881.

LOCATION: Keystone Harbor, Whidbey Island

nb:64:3

APPENDIX B - PART 1

COORDINATION AND PUBLIC INVOLVEMENT

1.01 Coordination and Public Involvement Framework. Coordination has been accomplished during the study through meetings, telephone calls, and correspondence with Federal, state, and local agencies. Close coordination was maintained with the State of Washington Department of Transportation, local sponsor, throughout plan formulation. The draft definite project report and environmental assessment (DPR/EA) was distributed in June 1991 for a 30-day public and agency review. In conjunction with the public review, a public information meeting was announced and held on July 2, 1991, at Coupeville on Whidbey Island. No private citizens apppeared and no comments were received at the meeting. Eight comment letters were received from public agencies.

1.02 Study Participants. The mailing list for review of the draft DPR/EA included the following agencies and groups as well as the local media.

a. Federal Agencies.

Department of Commerce
- National Oceanic and Atmospheric Administration
- National Marine Fisheries Service

Department of Health and Human Services
Department of the Interior
- Fish and Wildlife Service
- National Park Service, Interagency Archaeological Services

Department of the Navy, Naval Air Station, Whidbey Island
Department of Transportation, 13th District Coast Guard
Environmental Protection Agency, Region 10

b. Washington State Agencies.

Department of Commerce and Economic Development
Department of Ecology
Department of Fisheries
Department of Natural Resources
Department of Transportation, Marine Division (local sponsor)
Department of Wildlife
Office of Archaeology and Historic Preservation
Parks and Recreation Commission
Puget Sound Water Quality Authority

c. Local Government.

Island County Planning Department
Director
Shoreline Planner
Jefferson County Planning Department
Town of Coupeville
Port of Coupeville
City of Oak Harbor
City of Port Townsend
Port of Port Townsend
Northwest Air Pollution Authority

d. Other.

Evergreen Legal Services
Federation of Western Outdoor Clubs
Friends of the Earth
Northwest Salmon and Steelhead Council
Point No Point Treaty Council
Seattle Audubon Society
Seattle Chapter Isaac Walton League
Sierra Club
Washington Environmental Council
Washington Public Ports Association
Local libraries

1.03 Study Coordination. Coordination of the draft DPR/EA is discussed in section 5.03 of the main report. Public and agency review comment letters received during the 30-day draft DPR/EA review period are contained, along with responses to these comments, in appendix B, part 4.

APPENDIX B - PART 2

COORDINATION LETTERS

APPENDIX B, PART 2

COORDINATION LETTERS

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DUANE BERENTSON
Secretary

STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION
Marine Division Washington State Ferries, Colman Dock (Pier 52) • Seattle Washington 98104 • (206) 464-7830

September 21, 1988

Department of the Army
Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124-2255

Attention: Col. Philip L. Hall
Seattle District Engineer

Re: Keystone Ferry Terminal
Maintenance Dredging

Dear Col. Hall:

With reference to my telephone conversation with Mr. Steve Foster, WSDOT is hereby requesting that the Corps of Engineers consider additional dredging at Keystone Harbor in Admiralty Inlet under Section 107 of the 1960 River and Harbor Act. The Corps presently maintains a channel depth of -18 (MLLW=0), and we are requesting this depth be increased to -22.

The traffic demand on the Port Townsend/Keystone ferry run has increased to the point that Washington State Ferries has assigned larger vessels than previously used on the run. Consequently, with deeper drafts, the vessels cannot utilize the channel at lower tides, and service is suspended. In order to accommodate these larger vessels to a low tide of -4.5, the channel depth should be at -22.

From my conversation with Mr. Foster I understand your first report for the Section 107 Request will include a comparison between the costs to increase the channel depth and the impacts of not increasing the channel depth. We have initiated activities to provide you with these impacts, such as increased annual costs to WSF and the impacts of suspended service on the public.

We will be providing you with this information as soon as its developed. Please contact me at 464-7820 if you have any questions or comments.

Sincerely,

Warren L. Johnson, P.E.
Terminal Construction Engineer

WLJ:jla

cc: Kern Jacobson
Ben Klein

DEC 20 [illegible]

Planning Branch

Warren L. Johnson
Terminal Construction Engineer
Department of Transportation
Washington State Ferries
Coleman Dock
Seattle, Washington 98104

Dear Mr. Johnson:

The Seattle District, Corps of Engineers is currently completing the Reconnaissance Study phase of the proposed project to improve Keystone Harbor to accommodate state ferries at low tide. In order to develop the cost estimate for the feasibility phase to follow, we need to have your agreement on the scope of the project.

Eric Nelson of my staff recently made the Keystone sailing with Captain Ewing and they discussed the navigation problems. Mr. Nelson's report, enclosed, indicates that channel widening is not necessary and tentatively proposes deepening the outer half of the channel to -22 feet mean lower low water (MLLW) and the inner half to -25 feet MLLW. Channel width would be about 200 feet at these depths. Channel depths and widths will be looked at in detail during the feasibility study and further coordinated with you. We would appreciate it if you and Captain Ewing would review the report and return your comments to us within the next two weeks. Specifically, we need to know if you agree with the project plan and whether the Department of Transportation is willing to act as local sponsor.

We will advise you of the specific requirements of local sponsorship as soon as we have developed the feasibility study cost estimate.

Sincerely,

/S/

Encl

P. M. O'Dell, P.E.
Chief, Engineering Division

DUANE BERENTSON
Secretary

STATE OF WASHINGTON

DEPARTMENT OF TRANSPORTATION

Marine Division, Washington State Ferries, Colman Dock (Pier 52) • Seattle, Washington 98104 • (206) 464-7800

February 1, 1990

P. M. O'Dell
Chief, Engineering Division
Department of the Army
Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124-2255

Attention: Joanne Green

Re: Keystone Ferry Terminal Dredging

Dear Ms. Green:

With reference to your December 20, 1989 letter, this is to confirm that the Washington State Department of Transportation agrees to act as local sponsor in the revised dredging project. We have discussed Capt. Ewing's comments with Washington State Ferry Operations Management, and they have concurred with his opinion.

As local sponsor, WSDOT will provide an upfront contribution of 25 percent of the construction cost, plus an additional 10 percent immediately or over time. Preliminary estimates indicate this total would be approximately $123,000.

Sincerely,

Warren L. Johnson, P.E.
Terminal Construction Engineer

WLJ:ja

cc: Kern Jacobson
Capt. Schwartzman
Don Nutter

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX C-3755
SEATTLE, WASHINGTON 98124-2255

OCT 30 1990

REPLY TO ATTENTION OF

Planning Branch

Mr. Warren L. Johnson
Terminal Construction Engineer
Department of Transportation
Washington State Ferries
Coleman Building
811 First Avenue
Seattle, Washington 98104

Dear Mr. Johnson:

At the October 16, 1990 coordination meeting with you (see attached memorandum of the meeting discussion), we presented a plan for deepening the Federal channel at Keystone Harbor to accommodate ferry navigation at low tide. The plan called for deepening of the inner 500 feet of channel from the authorized depth of -18 feet mean lower low water (MLLW) to -25 feet MLLW and the outer 500 feet of channel from -18 feet MLLW to -22 feet MLLW. Captain Mecham requested that the -25 foot depth be extended into the outer channel, allowing ferries entering in low tide, swift current conditions to begin full reverse farther out in the channel while executing the docking maneuver. We have therefore changed the deepening plan to a uniform -25 foot depth throughout the entire length of the channel. The inner channel would be 200 feet wide at -25 feet. To avoid adverse environmental impacts and excessive dredging costs, the steep side slopes of the outer reach would not be dredged back. The result would be that the outer reach would be 200 feet wide at -22 feet but may be 5 to 10 feet narrower at a -25 foot depth. For the revised project, the estimated dredging quantities increase from 35,000 cubic yards (c.y.) to 48,000 c.y. and the estimated construction cost from $316,000 to $417,000. The local sponsor share of the construction cost will be coordinated with your office at a later date.

We agree that the captain must consider many factors in determining if sailing conditions are safe, but our understanding is that, with the channel deepened to a -25 foot depth, ferry trips now being cancelled at tides of -2.5 feet MLLW and lower would no longer be cancelled. Please provide written confirmation that this conclusion is correct, or if ferry operations policy is expected to change, please inform us, as a change in operations could affect project benefit analysis.

Based on historic ferry cancellations due to low tide, our economist has computed the benefits for various project depths and determined that -25 feet is economically justified and is also the depth at which the project benefits minus the project costs are greatest.

In order to proceed with the feasibility study, we need to have your agreement on the revised project plan. We would appreciate you and Captain Mecham (and other operations management staff if appropriate) reviewing the plan and returning your comments to us in the next two weeks.

Sincerely,

P. M. O'Dell, P.E.
Chief, Engineering Division

Enclosure

Washington State Department of Transportation
Marine Division
Washington State Ferries
Colman Dock/ Pier 52
801 Alaskan Way
Seattle, Washington 98104-1487
(206) 464-7800

Duane Berentson
Secretary of Transportation

November 27, 1990

Mr. P.M. O'Dell
Chief, Engineering Division
Department of the Army
Corps of Engineers
P.O. Box C-3755
Seattle, Wash. 98124-2255

Attention: Joanne Green

SUBJECT: Keystone Ferry Terminal
Dredging Keystone Harbor

Dear Ms. Green:

With reference to our October 16, 1990, coordination meeting and your letter received on October 31, 1990, attached are copies of memos to the WSDOT Marine Division's Operations Superintendent and Engineering Superintendent. These memos indicate concurrence with the proposed change in the scope of the subject project.

Very truly yours,

Warren L. Johnson

Warren L. Johnson, P.E.
Terminal Construction Engineer

WLJ:pc
Attachments
cc: Gerald Smith
Capt. Schwartzman
Don Nutter
Day File

Washington State Department of Transportation

Intra-Departmental Communication

Date: November 16, 1990

From: Warren L. Johnson WLJ
464-7820

Subject: Keystone Ferry Terminal
Corps of Engineers
Dredging Agreement

To: Capt. D.R. Schwartzman

Attached is a memo from the Army Corps of Engineers in regard to the subject project. I've highlighted the portions that are particularly pertinent to this IDC.

With reference to the Corps memo, we are now proposing that the depth of the channel be dredged to Elev. -25.0 for the full length of the 200 foot wide channel. However, due to the steep slopes at the outer channel, the -25.0 elevation can be maintained for a 190 foot width only, with the remaining 10 feet maintained at -22.0. The reasons for this situation are explained in the attached minutes to the October 16 meeting.

The Corps has requested written concurrence in the proposed scope of work and their conclusion that this action will eliminate the need to cancel trips at tides of Elev. -2.5 and lower. I am sending a similar IDC to Gerald Smith for funding concurrence from Engineering. An interagency coordination meeting is scheduled for November 28, 1990. I request that you respond to this IDC prior to that meeting.

CONCURRENCE _____
Capt. D. R. Schwartzman
Marine Operations Superintendent

WLJ:pc
Attachment

DOT 700-[illegible]

Washington State Department of Transportation

Intra-Departmental Communication

Date: November 16, 1990

From: Warren L. Johnson WLJ
464-7820

Subject: Keystone Ferry Terminal
Corps of Engineers
Dredging Agreement

To: Gerald Smith

Attached is a memo from the Army Corps of Engineers in regard to the subject project. I've highlighted the portions that are particularly pertinent to this IDC.

For some background, WSDOT has entered into an agreement (GC 8914) with the Corps to study the feasibility of dredging Keystone Harbor to Elev. -25.0 (MLLW=0.0). Presently, the Corps has approval from Congress to maintain the harbor at Elev. -18.0, and the Marine Division has been responsible for additional dredging to Elev. -22.0. Under these circumstances ferry trips have been delayed and cancelled at low tides. The intent of this project is to eliminate those delays and cancellations.

Section 107 of the 1960 River and Harbor Act provides authority to the Corps to plan and construct small (under $4 million) navigation projects that have not been specifically authorized by Congress. Under this agreement, the local sponsor, in this case WSDOT, provides 50% of the cost of the feasibility study, of which we have paid already; and 35% of the eventual construction cost. In addition to contributing 65% of the construction cost, the Corps is responsible for preparation of the PS&E documents and administration of the contract.

This project is funded in the Capital Program under PIN 902017D, for $150,000. With reference to the Corps memo, we are proposing that the scope of work be expanded from a $316,000 project to a $417,000 project. Our existing funding is sufficient to fund the new scope of work. The Corps has requested written concurrence in the proposed scope of work. I am sending a similar IDC to Capt. Schwartzman for concurrence from Operations. An interagency coordination meeting is scheduled for November 28, 1990. I request that you respond to this IDC prior to that meeting.

CONCURRENCE Gerald E Smith
Gerald Smith
Marine Engineering Superintendent

WLJ:pc
Attachment

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX -3755
SEATTLE, WASHINGTON 98124-2255

REPLY TO ATTENTION OF

JAN 10 19[illegible]

Planning Branch (1105-2-55)

Mr. Jacob E. Thomas
State Historic Preservation Officer
Washington State, Office of Archeology
and Historic Preservation
111 West 21st Avenue, KL-11
Olympia, Washington 98504-5411

Reference: Keystone Harbor Channel Deepening,
Admiralty Inlet, Whidbey Island, WA

Dear Mr. Thomas:

The U.S. Army Corps of Engineers is studying the feasibility of deepening the channel at Keystone Harbor. The current plan calls for dredging the 200 foot-wide, 1000 foot-long channel from present average depth of -21 feet to -25 feet MLLW (enclosure 1), and disposal of an estimated 48,000 cubic yards of dredged material at the Port Townsend Puget Sound Dredge Disposal Analysis openwater site. Dredged material from future routine maintenance will be used for beach nourishment at the upland disposal site immediately east of the dredged channel, as in the past. This Harbor facility is used by the Washington State Ferry System for the Keystone to Port Townsend ferry run.

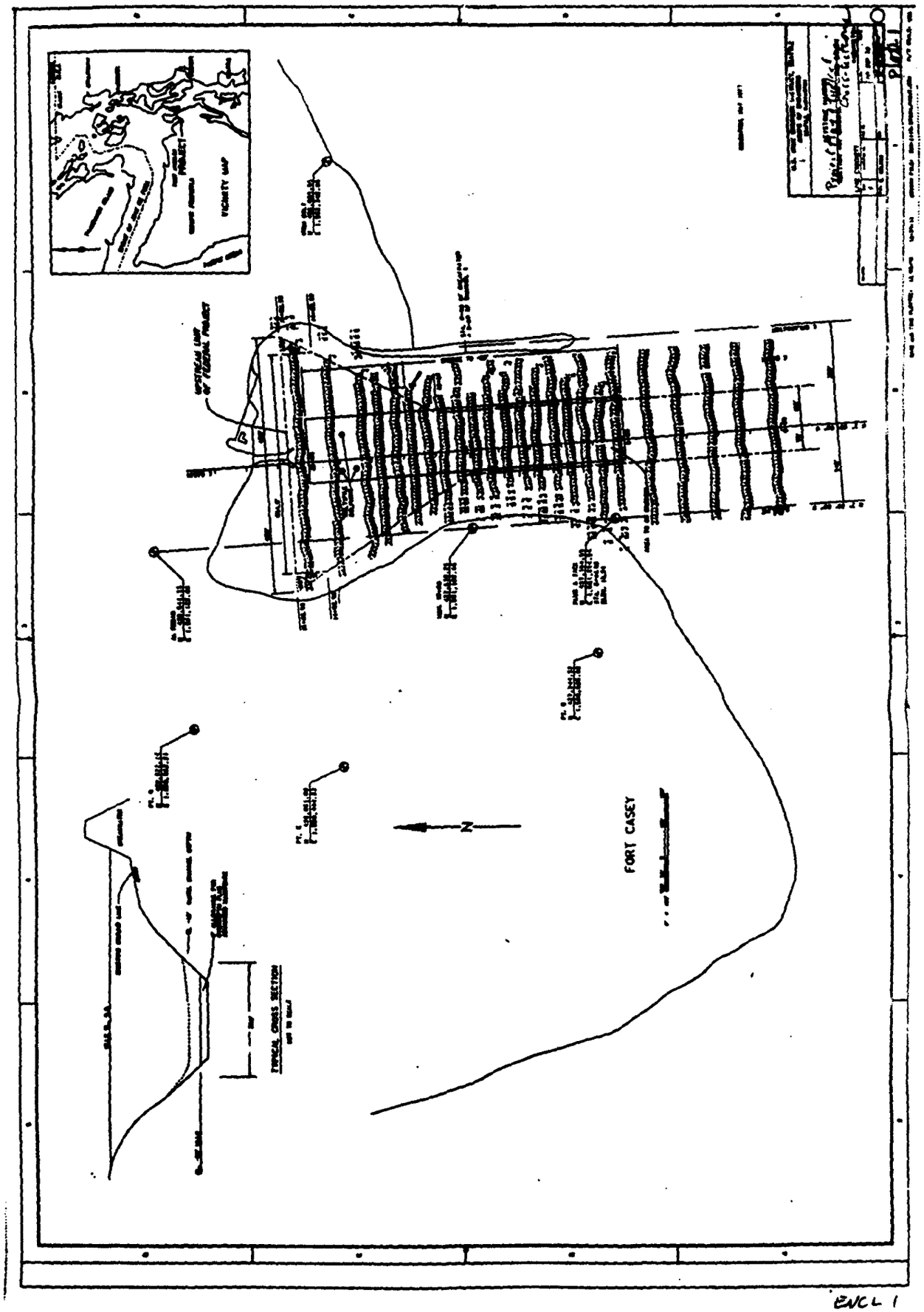
Since this project lies within the Central Whidbey Island Historic District, including Fort Casey State Park, we are requesting your opinion regarding the effect of our project on a National Register Historic District. Since channel maintenance dredging has previously occurred here and no new areas will be dredged, and since dredged materials are scheduled for disposal at an openwater site, it is our opinion that this project will have no adverse effect on the historic qualities of the National Register District. Since our last correspondence with your office on this topic was in August 1975 (enclosure 2), we are again requesting your concurrence or other comment. If you need further information, please contact Dr. David Rice at (206) 764-3630.

Sincerely,

Lester E Soule

P.M. O'Dell, P.E.
Chief, Engineering Division

Enclosures


VICINITY MAP
FORT CASEY
N
TYPICAL CROSS SECTION
ENCL 1

WASHINGTON STATE
ADVISORY COUNCIL ON HISTORIC PRESERVATION
P. O. BOX 1128, OLYMPIA, WASHINGTON 98504

August 20, 1975

Mr. Frederick Weber
Department of the Army
Seattle District, Corps of
Engineers
4735 East Marginal Way S
Seattle, Washington 98134

Dear Mr. Weber:

We have examined the proposed maintenance dredging at Keystone Harbor, a property included within the Central Whidbey Island Historic District, and believe that it will have no adverse effect on the existing quality of the Historic District.

Thank you for the opportunity to comment on your project.

Sincerely,

David M. Hansen, Chief
Office of Archaeology and
Historic Preservation

kb

WILLIAM E. STEWARD, Ed.D.
Chairman

WASHINGTON STATE HERITAGE COUNCIL

111 West Twenty-First Avenue, KL-11 • Olympia, Washington 98504-5411 • (206) 753-4011

January 29, 1991

Mr. P. M. O'Dell, P.E.
Department of the Army
Seattle District, Corps of Engineers
P.O. Box 3755
Seattle, WA 98124-2255

Log Reference: 1712-F-COE-S-03
Re: Keystone Harbor Channel Deepening, Admiralty Inlet, Whidbey Island, WA

Dear Mr. O'Dell:

I have reviewed your recent letter regarding the Keystone Harbor Channel Deepening project on Whidbey Island within the boundaries of the Central Whidbey Island Historic District. It is my understanding that the project will not involve any areas of new dredging, and that dredge materials are scheduled for disposal at an openwater site. Therefore, it is my opinion that the project will have no effect on the historic qualities of the district.

If I can be of further assistance, please call me at (206) 586-2901.

Sincerely,

Leonard D. Garfield

Leonard T. Garfield
Preservation Programs Coordinator

pr

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX -3755
SEATTLE, WASHINGTON 98124-2255

REPLY TO ATTENTION OF

CONCUR

FEB 1 7 1991

ADVISORY COUNCIL ON HISTORIC PRESERVATION

For Claudia Nissley KLP
CLAUDIA NISSLEY
Director, Western Office

Planning Branch (1105-2-55)

JAN 1 0 1991

Ms. Claudia Nissley, Director
Western Office of Project Review
Advisory Council on Historic Preservation
730 Simms Street, Room #401
Golden, Colorado 80401

Reference: Keystone Harbor Channel Deepening,
Admiralty Inlet, Whidbey Island, WA

Dear Ms. Nissley:

The U.S. Army Corps of Engineers is studying the feasibility of deepening the channel at Keystone Harbor. The plan calls for dredging the existing 200 foot-wide, 1000 foot-long channel from present average depth of -21 feet to -25 feet MLLW (enclosure 1) and disposal of an estimated 48,000 cubic yards of dredged material at the Port Townsend Puget Sound Dredge Disposal Analysis (PSDDA) openwater site. Dredged material from future routine maintenance will be used for beach nourishment at an existing upland disposal site immediately east of the dredged channel, as in the past. This Harbor facility is used by the Washington State Ferry System for the Keystone to Port Townsend ferry run.

Since this project lies within the Central Whidbey Island National Historic District, including Fort Casey State Park, we are requesting your comments regarding the effect of our project on a National Register Historic District. Since channel maintenance dredging has previously occurred here and no new areas will be dredged, and since the dredged materials are scheduled for disposal at an openwater site (the PSDDA disposal site was previously evaluated for cultural resources as a separate undertaking and found to contain none), it is our opinion that this project will have no adverse effect on the historic qualities of the National Register District. In previous consultation with the Washington State Historic Preservation Office in 1975 (enclosure 2), they determined that this work would have no adverse effect on the historic property. To update our project records, we have again requested their comment. Please reply with your

concurrence or other comment. If you need further information, please contact Dr. David Rice at (206) 764-3630.

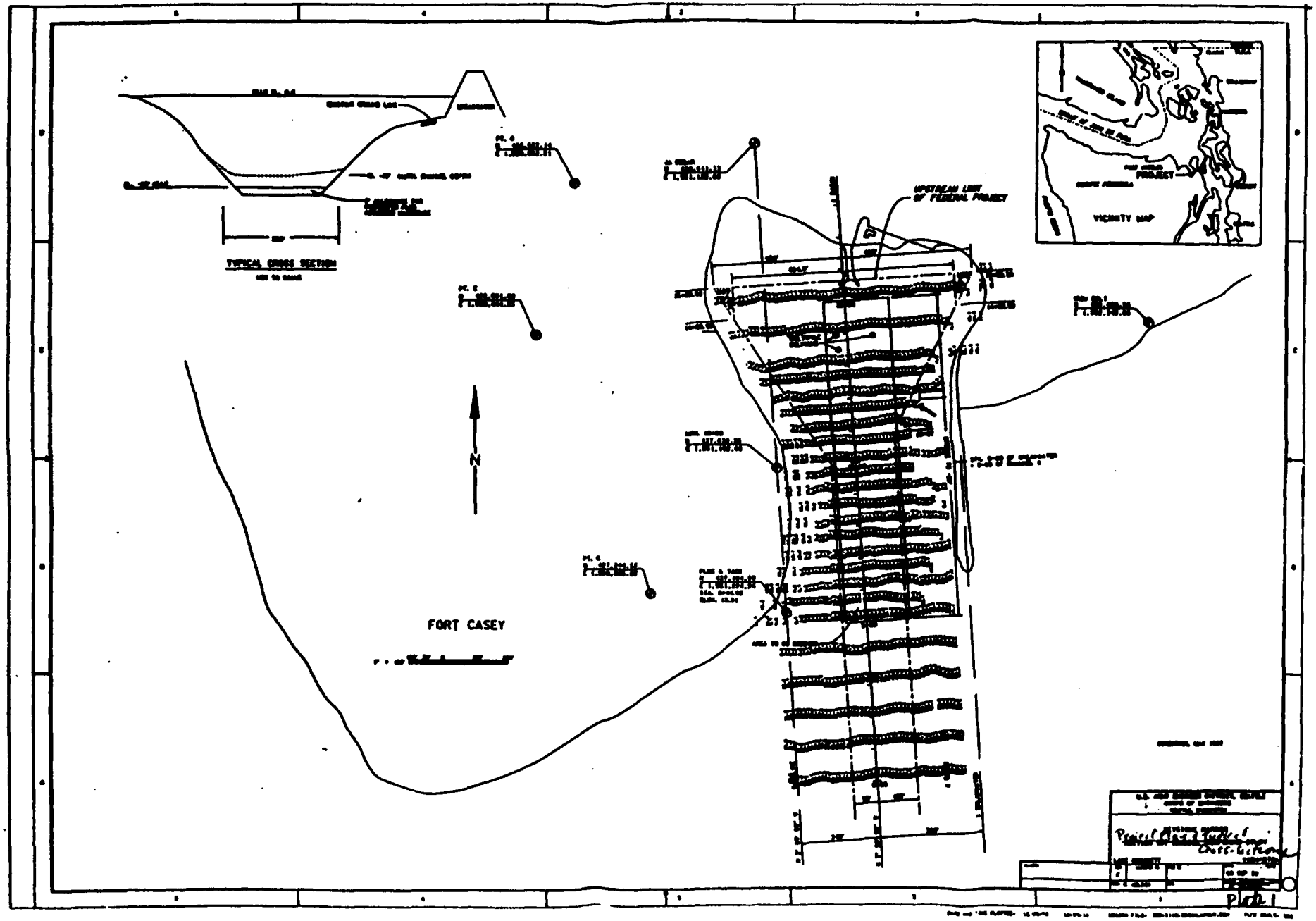
Sincerely,

Lester E Soule

For P.M. O'Dell, P.E.
Chief, Engineering Division

Enclosures

Copy Furnished w/ encls:
Mr. Jacob E. Thomas
Washington State Historic Preservation Officer
Olympia, Washington 98504-5411


TYPICAL CROSS SECTION
VICINITY MAP
UPSTREAM LIMIT OF FEDERAL PROJECT
FORT CASEY
N

B2-16

EUCL1

WASHINGTON STATE
ADVISORY COUNCIL ON HISTORIC PRESERVATION
P. O. BOX 1128, OLYMPIA, WASHINGTON 98504

August 20, 1975

Mr. Frederick Weber
Department of the Army
Seattle District, Corps of
Engineers
4735 East Marginal Way S
Seattle, Washington 98134

Dear Mr. Weber:

We have examined the proposed maintenance dredging at Keystone Harbor, a property included within the Central Whidbey Island Historic District, and believe that it will have no adverse effect on the existing quality of the Historic District.

Thank you for the opportunity to comment on your project.

Sincerely,

David M. Hansen, Chief
Office of Archaeology and
Historic Preservation

kb

Washington State Department of Transportation
Marine Division
Washington State Ferries
Colman Dock/ Pier 52
801 Alaskan Way
Seattle, Washington 98104-1487
(206) 464-7800

Duane Berentson
Secretary of Transportation

March 8, 1991

Mr. P. M. O'Dell
Chief, Engineering Division
Department of the Army
Corps of Engineers
P.O. Box C-3755
Seattle, Wash. 98124-2255

Attention: Joanne Green

SUBJECT: Keystone Ferry Terminal
Dredging Keystone Harbor

Dear Ms. Green:

With reference to the subject project, and its Feasibility Study, attached is the following:

Exhibit A - Statement of Financial Capability

Exhibit B - Financing Plan

This letter is to confirm the verbal commitment of the Washington State Department of Transportation, Marine Division, to proceed with the Feasibility Study to completion. This commitment is made with the understanding that all study work items as described in Agreement Appendix A, Scope of Studies, will be completed; and all data and information will be made available to WSDOT in accordance with Article II of the Agreement.

Very Truly Yours,

Warren L. Johnson, P. E.
Terminal Construction Engineer

WLJ:pc
Attachments*

cc: Gerald Smith
Tim McGuigan

* See revised attachments on pp. 28, 29 and 30 and pp. C-15, C-16 and C-17.

Current Sponsor Letter to be placed here.

APPENDIX B - PART 3

FISH AND WILDLIFE COORDINATION ACT REPORT

AND

CORPS OF ENGINEERS RESPONSES TO

U.S. FISH AND WILDLIFE SERVICE RECOMMENDATIONS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
3704 Griffin Lane SE, Suite 102
Olympia, Washington 98501-2192
206/753-9440 FTS 434-9440
FAX: 206/753-9008 FTS 434-9008

August 23, 1991

Colonel Milton Hunter
District Engineer
Environmental Resources Section
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124
Attention: Linda Cox

Dear Colonel Hunter:

Enclosed is a copy of the final Fish and Wildlife Coordination Act report for the U.S. Army Corps of Engineers (Corps) Section 107 Channel Deepening Study of Keystone Harbor, Island County, Washington. The report is based on the Corps' assessments of maintenance dredging activities in the area, and on U.S. Fish and Wildlife Service (Service) field assessment, research, and consultation and coordination with other resource agencies. The document contains a description of fish and wildlife resources at the proposed project site and presents Corps' project plans. We have provided a discussion of potential impacts and methods of remediation to reduce and avoid impacts to fish and wildlife resources. A further report may be prepared if project plans or specifications are changed.

We welcome any comments regarding the fish and wildlife resources of the Keystone Harbor project area, Fish and Wildlife Service analysis of predicted impacts, or Service recommendations for reducing or avoiding the impacts. If you have any questions or wish to consult with the Service, please contact Mr. Lynn Childers of my staff at the letterhead phone/address.

Sincerely,

Nancy J. Gloman
Acting Field Supervisor

Enclosure

dw/lk

c: EPA, Seattle (Smith)
NMFS, Portland (Elliot)
WDE, Olympia (McMillan)
WDF, Everett (Williams)
WDW, Olympia (Muller)

FISH AND WILDLIFE COORDINATION ACT REPORT

FOR SECTION 107 CHANNEL DEEPENING STUDY

KEYSTONE HARBOR, ISLAND COUNTY, WASHINGTON

Prepared for the U.S. Army Corps of Engineers
Seattle District, Seattle, Washington

Prepared by
E. Dawn Whitehead, Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Fish and Wildlife Enhancement
Olympia, Washington

August 1991

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INTRODUCTION

This document provides the U.S. Fish and Wildlife Service's (Service) report on the potential impacts to fish and wildlife resources associated with the Keystone Harbor Channel Deepening Project. The project site is located on the west side of Whidbey Island in Island County, Washington. The report has been prepared under the authority and provisions of Section 2(b) of the Fish and Wildlife Coordination Act (Act). It supersedes our March 30, 1990, Planning Aid Letter and March 4, 1991 draft Fish and Wildlife Coordination Act Report. This completes our reporting requirements under the Act and is issued after review of final project plans, consideration of beneficial uses of the dredged material, and full coordination of environmental concerns with other resource agencies.

This report is based on a U.S. Army Corps of Engineers (Corps) maintenance dredging environmental assessment of April, 1980, Corps supplemental environmental assessments of August 1981 and June 1987, and the Corps Draft Definite Project Report and Draft Environmental Assessment of June 1991. Site assessment, project briefings, and interagency coordination have also occurred. Reconnaissance level comments were submitted by the Service in a March 30, 1990 Planning Aid Letter, and subsequently coordinated at a November 28, 1990, meeting with representatives from Island County; Washington State Departments of Ecology, Fisheries, and Transportation; the Army Corps of Engineers; and the U.S. Environmental Protection Agency. In March 1991, the Service compiled a draft Fish and Wildlife Coordination Act Report in coordination with the Corps and with National Marine Fisheries Service, and solicited comments from the Washington State Departments of Fisheries, Wildlife, and Ecology.

PROJECT AREA DESCRIPTION

Keystone Harbor lies 35 nautical miles northwest of Seattle, Washington, on the west side of Whidbey Island, between Lake Crockett and Admiralty Bay at Township 31N, Range 01E, Section 22 (Figure 1). The northeastern tip of the Olympic Peninsula (Port Townsend) is 4 nautical miles west of Admiralty Bay. Admiralty Bay lies adjacent to Admiralty Inlet at the north end of Puget Sound. A 500-foot-wide gravel beach separates the Bay from Lake Crockett. Keystone Harbor was dredged from a portion of this gravel beach, and the Harbor's entrance channel connects with the Bay.

The original project, consisting of a mooring basin and entrance channel, was dredged by the Corps in 1948. A rock breakwater to the east of the channel entrance and a boat launching ramp were also constructed at that time. A state underwater park lies east of, and adjacent to, the breakwater. The Washington Parks and Recreation Commission leases the project site from the Corps, and overnight campsites are sited on the west side of the harbor. The Washington State Department of Transportation, whose ferry docks at the north end of the basin, subleases from the Parks Commission. Currently, the basin area is approximately 6 acres in size and -18 feet mean lower low water (mllw) in depth. The entrance channel is 200 feet wide by approximately 800 feet long, and also -18 feet mllw in depth (Figure 1).

The project area receives moderate wave action from the Strait of Juan de Fuca and the beach system is nourished by unconsolidated glacial deposits from uplands (Webber 1979). At the time of the November 6, 1989, site visit the beach in the study area was composed of coarse sand with small gravel to the water's edge. A small spit of coarse sand extended on the east side of the basin south of the boat ramp. The 200- by 800-foot area proposed for dredging will yield mostly coarse sands and gravel. This location has been maintained by dredging since 1948 and was last disturbed in 1989.

Whidbey Island itself is 40 miles long and varies from 1 to 10 miles wide. It was once covered with dense forests of Douglas fir associated with western hemlock and western red cedar, and small prairie areas. All virgin timber has been cut and the prairie areas cultivated. The island also contains small peat bogs, depressional wetlands, small freshwater lakes, small intermittent streams, and a few permanent spring-fed streams on the south end of the island. Regional physiography is described as the Pacific mountain division, Pacific border province, Puget Trough section (United States Department of Agriculture 1958). The climate is very uniformly moderate and of marine origin.

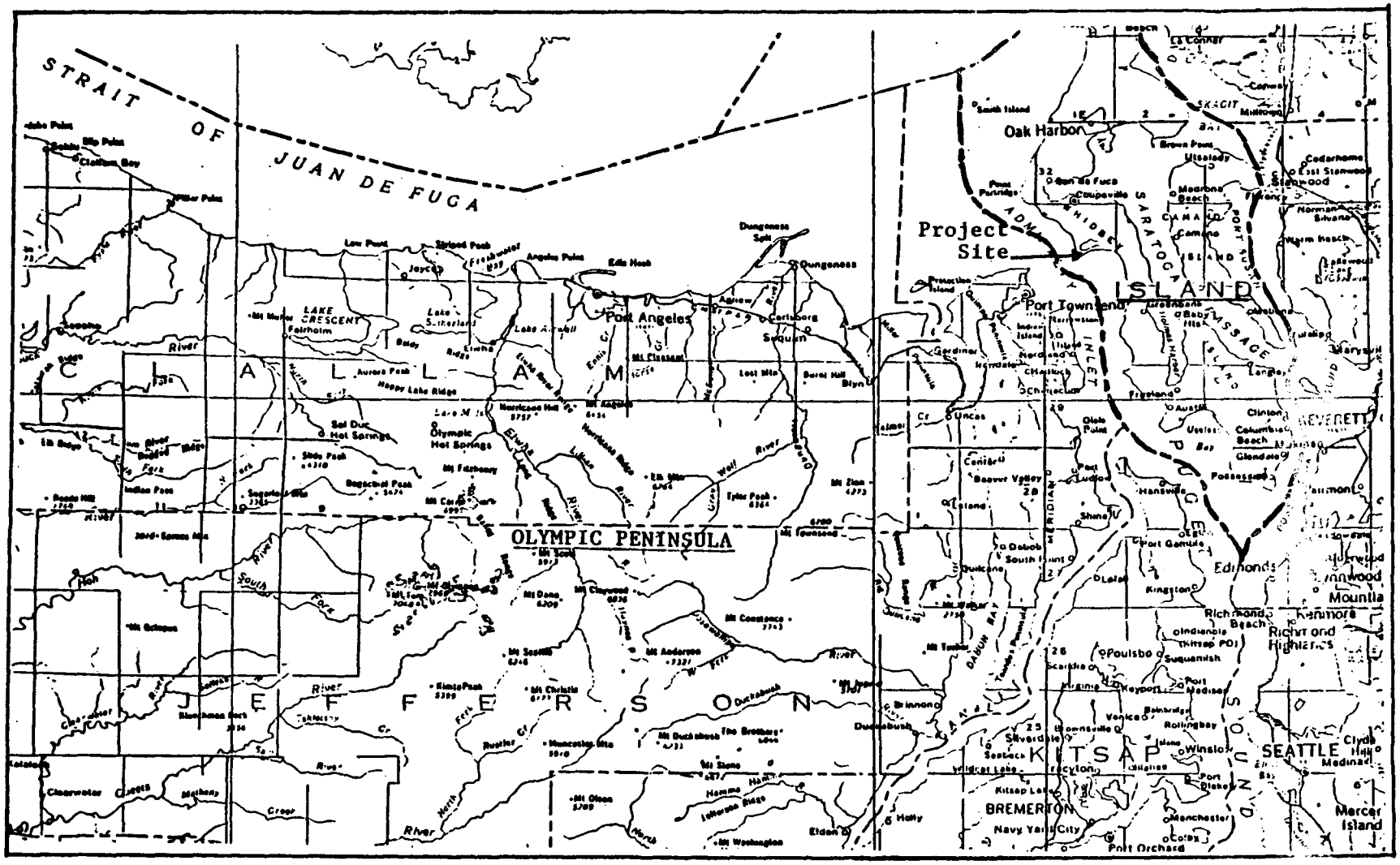
PROJECT PLAN

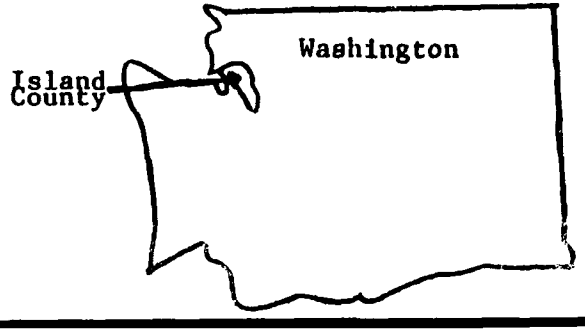
The Corps proposes an increase in entrance channel depth from -18 to -27 mllw within the 200-foot-wide basin (Figure 2). The project will be accomplished by clamshell dredging of 48,000 cubic yards of sediment during December 1992 and January 1993. The amount includes 2 feet of overdredge allowance. Since construction of the breakwater to the east, sediments are trapped and shoal at the entrance where they are no longer subject to deposition on the east beach. Maintenance dredging will be performed prior to channel deepening under separate authority, and these sediments will be used for beach nourishment on the east beach. Dredging is restricted by the Washington Department of Fisheries in the harbor from March 15 to June 15 to protect juvenile salmonids. Some or all of the dredged material from channel deepening work will be disposed of at the approved Puget Sound Dredge Disposal Analysis (PSDDA) Site 14. Site 14 is located 14 miles west of Port Townsend. According to the 1989 *Puget Sound Dredge Disposal Analysis, Final Environmental Impact Statement, Unconfined Open Water Disposal for Dredged Material Phase II (North and South Puget Sound)*, Site 14 is available for sediment disposal from December through August. Alternatives for beneficial uses of the dredged material are still being explored.

AQUATIC RESOURCES

Admiralty Inlet provides habitat to an abundance and diversity of life, ranging from algae to anadromous salmonids to marine mammals and seabird colonies. The Inlet and Bay support both commercial and recreational fisheries. Sensitive areas (as defined by the Washington Department of Wildlife for marine mammals such as harbor seals, river otters, and northern sea lions) are located approximately 5 nautical miles west-southwest of the Harbor. The northern half of the west side of Whidbey Island is flanked with kelp and shellfish beds (Evans-Hamilton and D.R. Systems 1987). Concentra-

FIGURE 1


STRAIT OF JUAN DE FUCA
Project Site
Port Angeles
Port Townsend
Oak Harbor
OLYMPIC PENINSULA
CLALLAM
JEFFERSON
ISLAND
SKAGIT
SNOHOMISH
KITSAP
SEATTLE
BREMERTON
EVERETT
Edmonds
Mountla
Richmond Highlands
Mercer Island
Lake Crescent
Sol Duc Hot Springs
Olympic Hot Springs


Washington
Island County

tions of seabirds such as glaucous-winged gulls, double-crested cormorants, pelagic cormorants, pigeon guillemots, tufted puffins, rhinoceros auklets, (Figure 2) black oystercatchers, and arctic terns occur in and around Admiralty Inlet (National Oceanic and Atmospheric Administration, no date).

The proposed project area supports algae and a few horse clams on the nearshore bottom. Algal growth in the intertidal and shallow subtidal areas provides habitat for crabs and other invertebrates. The Department of Ecology reports that Dungeness crabs generally overwinter in nearshore sediments from November through March. However, the crabs normally do not prefer southern exposures and deep channel situations, such as the Keystone Harbor, for burrowing.

The abandoned wharf and the breakwater provide attachment points for kelp and rockweed and for organisms such as barnacles, chitons, mussels, tube worms, and sea anemones. These in turn provide food and cover for several fish species. Ling cod, greenling, and wolf eels are examples of common fish species. Neither surf smelt nor herring spawning is known or expected in the harbor. Juvenile salmonid species such as coho, chinook and chum salmon, sea-run cutthroat trout, and Dolly Varden char migrate through this nearshore area in late winter and early spring. Juvenile pink salmon use the area every other year and will be in the harbor area this year. The migrant salmon depend upon benthic species as a food source. Keystone Harbor is considered a closed area by the Washington Department of Fisheries from March 15 to June 15 to protect juvenile salmonid rearing. This necessitates harbor closing to dredging, pile driving, or any type of construction activity in or near the water.

The area proposed for project sediment disposal is PSDDA site number 14. This site is located 14 miles west of Port Townsend and has been previously assessed for environmental considerations in a 1989 environmental impact statement. The decision reached during the environmental planning allows site utilization from December through August. Disposal is off limits from September 1 and November 30 due to heavy shrimp (*Pandalus borealis*) utilization.

TERRESTRIAL RESOURCES

Land around Keystone Harbor and Lake Crockett is generally hilly and forested, with the exception of a grassy area upland from the east beach that is dotted with a few shrubs. The east beach area, listed as a potential beach nourishment site for pre-project maintenance dredging materials, is currently composed of coarse sand and gravel. It offers feeding and resting areas for shorebirds such as sandpipers, plovers, and dunlins. Nearby Lake Crockett and its wetlands support waterfowl and raptors that feed along the shoreline.

THREATENED AND ENDANGERED SPECIES

In accordance with Section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531, et seq.), the Corps is required to assure that their actions have taken into consideration impacts to federally listed or proposed threatened or endangered species. In March 1991 we sent a list of species potentially

occurring in the area pursuant to Section 7(c). An evaluation of bald eagle use of the area was included in your draft environmental assessment of June 1991. Concerns which we had recommended that the Corps address in project planning were the level of eagle use in the project area, predicted project effects on eagle food stocks and foraging areas, and impacts to the eagle from project operation and activities. The general and specific impacts that we recommended for consideration were discussed in the draft environmental assessment.

We concur with the draft environmental assessment conclusion that no impacts to bald eagles from dredging of Keystone Harbor with a clamshell dredge in December and January are likely in either the long or short term.

Marine mammals such as whales and dolphins range widely through Puget Sound. Temporary displacement of marine mammals may occur from the tug and barge traffic to the spoil area. This was considered and discussed in the Corps draft 404 (b)1 evaluation for this project. The conclusion was that the current level of marine traffic and use of the area provides ongoing disturbance and the barge traffic to the spoil area from this project is not expected to affect marine mammals significantly.

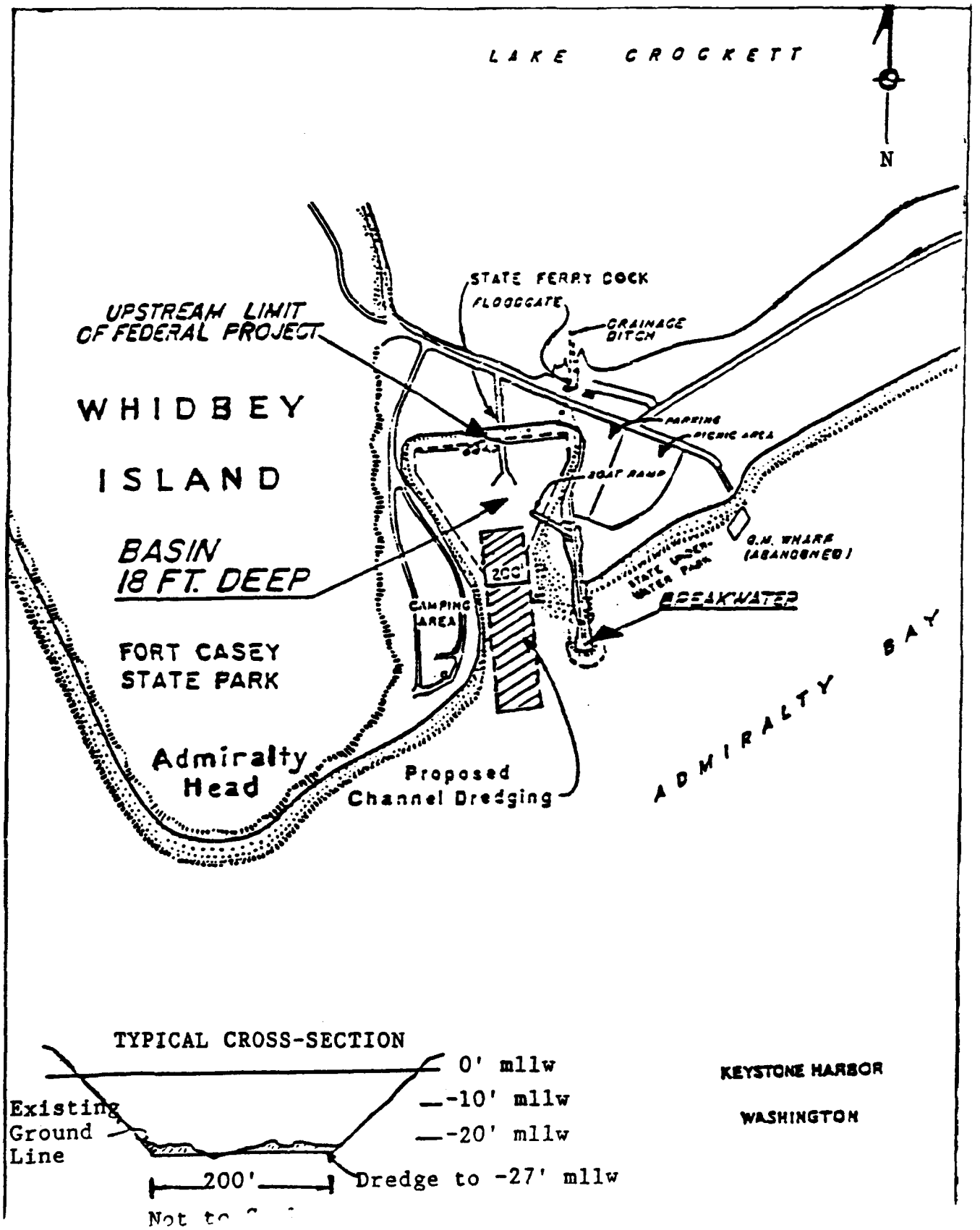
Finally, since the beginning of project planning and since our last report on the Project, the marbled murrelet (*Brachyramphus marmoratus*) has been proposed for federal listing. We are now sending an updated species list to assist you further in project planning. In cases where a listed species may be present in the project area, planners should consider the listed species and proposed species as well. Since the eagle has been considered, with no impacts anticipated, we recommend that you also mention the marbled murrelet in the environmental assessment with a general discussion of any project impacts on its winter feeding or resting behavior. We suggest that you also use a "likely to" or a "not likely to adversely affect the marbled murrelet" statement in concluding a murrelet discussion.

FUTURE WITHOUT THE PROJECT

Aquatic Resources

Without deepening of the Keystone Harbor entrance channel, impacts to the aquatic resources should remain constant. Routine maintenance dredging of the channel for ferry access would continue. Maintenance work usually includes beach nourishment with clean sediments. Coarse sand and gravel from the dredging operation are placed landward of the beach and extended to the -5 foot mllw line along approximately 600 feet from the breakwater, east to the abandoned Quartermaster wharf (Figure 2). Historical fill limits for beach nourishment are observed and material is placed and uniformly graded on the beach, sloping away from the abandoned wharf, breakwater, and underwater park. Deposition of sediments into the intertidal zone (the -5 foot mllw line) smothers benthic invertebrates, and continual maintenance dredging will most likely inhibit ecological succession from pioneer invertebrate species to a diverse and complex benthic community.

FIGURE 2


LAKE CROCKETT
N
STATE FERRY DOCK
FLOODGATE
DRAINAGE DITCH
UPSTREAM LIMIT OF FEDERAL PROJECT
WHIDBEY ISLAND
BASIN 18 FT. DEEP
PARKING
PICNIC AREA
BOAT RAMP
G.N. WHARF (ABANDONED)
STATE UNDERWATER PARK
BREAKWATER
200'
CAMPING AREA
FORT CASEY STATE PARK
Admiralty Head
Proposed Channel Dredging
ADMIRALTY BAY
TYPICAL CROSS-SECTION
0' mllw
-10' mllw
-20' mllw
Existing Ground Line
200'
Dredge to -27' mllw
KEYSTONE HARBOR
WASHINGTON

Terrestrial Resources

Without the project, impacts to wildlife are not expected to change. Current impacts are associated mainly with potential disturbance from ferry traffic and tourists. These potential disturbance factors decrease greatly after Labor Day, when tourism slows. This is also the most critical period for wintering eagle and migratory bird use. The routine maintenance dredging and accompanying beach nourishment is expected to continue. The nourishment work may temporarily disrupt shorebird use of the east beach area while the materials are being placed.

FUTURE WITH THE PROJECT

Aquatic Resources

The proposed project for Keystone Harbor would entail dredging activities and probable spoil disposal in a PSDDA area. Dredging and beach nourishment have occurred on this site previously as maintenance activities; however, current plans are for entrance channel deepening. The main difference between deepening and routine maintenance work is that previously undisturbed sediments will be removed in the deepening phase and more spoil will be generated for disposal. The magnitude of impacts to fishery resources depends on specific work plans, such as the type of dredge to be used and the timing of dredging. Potential impacts to aquatic resources stem from destruction of benthic and invertebrate organisms, creation of turbidity, possible water quality impacts, and temporary disturbance of terrestrial organisms.

Selection of the type of dredge to be used is crucial to avoiding and minimizing impacts. The clamshell dredging option has been selected. Most dredging activities in Puget Sound are accomplished via clamshell because less turbidity is generated. We recommended and support this method for deepening the Keystone Harbor entrance channel.

Benthic and other invertebrate organisms in the localized dredging and disposal areas would be destroyed from project activities. It is uncertain if both numbers and diversity of benthic organisms would reestablish soon after dredging impacts. Recolonization depends upon the composition and stability of the substrate. Typically, benthic reestablishment takes about two years, although it can take up to ten years (Bureau of Land Management 1980). Even if the benthos does begin immediate reestablishment, it is unlikely that predredging benthic organism biomass will be attained for several to many years. These organisms will probably remain reduced due to maintenance dredging activities. Additionally, Dungeness crabs generally concentrate in sandy locations and burrow down for overwintering. Any such concentrations would be eliminated by dredging activities. Currently, however, no crabs have been determined to overwinter in the dredge or disposal areas. As previously discussed, Washington Department of Ecology reports that crab use is probably limited by the northern exposure of the harbor and the deep channel situation.

Sediments are suspended during actual dredging, during disposal, and for several months after disposal as fine-grained materials sift out from the sand and are transported by the current. Possible direct impacts to marine

organisms from turbidity are clogging and abrading of gills, while indirect effects accrue with lowered light penetration into the water column and a corresponding lessening of algae and diatom production. This would probably cause minor damage to the plankton community, localized invertebrate damage, and temporary displacement of fish.

These impacts will be avoided or minimized by preventing unnecessary disturbance of areas adjacent to the dredge and disposal sites and by scheduling the work in December and January, periods when biological activity is relatively low. From March 15 through June 15, juvenile salmon migrate through the area. During this time, the intertidal shoreline is a juvenile rearing zone for outmigrating anadromous fish. Dredging is prohibited by the Washington Department of Fisheries during this time period. Timing restrictions also apply to proposed disposal in PSDDA site 14. Because of heavy shrimp (*Pandalus borealis*) use and migration through the site, it is closed for disposal activity from September 1 through November 30. Given these aquatic environmental concerns and restrictions, the window of opportunity for the proposed dredging and disposal activities is met by the December and January dredging schedule.

Water quality in Admiralty Inlet is rated as "AA" by the Washington Department of Ecology. This means that requirements for wildlife habitat and fish and shellfish reproduction, rearing, and harvest are exceeded. The project area sediments are referred to as clean in the draft environmental assessment prepared for 1980 maintenance dredging of the Keystone Harbor and also in the 1987 Finding of No Significant Impact which was also issued for maintenance dredging of the harbor. However, at a November 1990 interagency meeting, the Environmental Protection Agency raised concern over phenol concentrations detected in project area sediments during a pre-screening analysis. Subsequent sampling and analyses in January determined that the material met PSDDA standards and is eligible for open water disposal in a PSDDA approved site. A January 14, 1991, memo from the Corps outlines sediment sampling and testing results and indicates that none of the PSDDA chemicals of concern exceeded the protocol for initial screening limits.

Beneficial uses of the material, such as enhancement of clam habitat, have been discussed with Washington Department of Fisheries and other resource agencies. At the present, clam habitat enhancement appears to be the most viable environmentally beneficial use for the material. The Corps, with assistance from the Washington Department of Fisheries Shellfish Laboratory, is pursuing further details on locations and amounts of sediment useful for shellfish enhancement.

Terrestrial Resources

Terrestrial species such as waterfowl, shorebirds, colonial nesting birds, and perhaps the threatened bald eagle may be temporarily disturbed by project activities. Timing of construction activities to avoid wintering waterfowl concentrations will minimize some of the temporary impacts. The bald eagle has been discussed in a previous section and in the Corps environmental assessment.

CONCLUSIONS AND RECOMMENDATIONS

It is the policy of the Service to seek to avoid, minimize, reduce, and rectify over time any potential impacts to fish and wildlife resources. These goals are to be accomplished in the order listed. Compensatory mitigation is a final step to be considered when no practicable alternatives exist to avoid or minimize impacts. This report has listed the fish and wildlife resources associated with Keystone Harbor and the future of these resources both with and without the project. Negative impacts will be minimized by leaving adjacent aquatic sites undisturbed and by scheduling dredging activities to avoid migrating juvenile salmon from March 15 to June 15, migratory waterfowl, and possibly wintering bald eagles and marbled murrelets. Impacts at the disposal site will be avoided by scheduling at times other than those of high shrimp usage, from September 1 through November 30.

Our recommendation is that the Corps continue to investigate the possibility of beneficial uses of the dredged material, including the option of enhancing clam beds, and coordinate these plans with the Service. If changes are made to the dredging or disposal specifications, the Fish and Wildlife Service will reevaluate any potential impacts and make further recommendations to protect fish and wildlife resources.

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LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CANDIDATE SPECIES THAT MAY OCCUR WITHIN THE AREA OF THE PROPOSED KEYSTONE HARBOR ENTRANCE CHANNEL DEEPENING, ISLAND COUNTY, WASHINGTON

1-3-91-SP-427

LISTED

Bald eagle (*Haliaeetus leucocephalus*) - Wintering bald eagles may occur in the vicinity of the project from about October 31 through March 31.

Nesting territories are located in T31N R1E S6. Nesting activities occur from about January 1 through August 15.

Major concerns that should be addressed in your biological assessment of project impacts to bald eagles are:

1. Level of eagle use in the project area.

2. Predicted project effects on eagle food stocks and foraging areas affected by the project.

3. Impacts to the eagle from project operation and activity (including loss of habitat, creation of concussive or elevated noise levels, increased human activity, and increased boat or barge traffic) which could result in degradation to eagle habitat and lead to disturbance to bald eagles and/or eagle avoidance of the project area.

PROPOSED

Marbled murrelet (*Brachyramphus marmoratus*)- Murrelets may winter in the Keystone Harbor area.

Concerns that should be addressed are potential project impacts to feeding and resting behavior of the birds.

CANDIDATE

None

Appendix A

FEDERAL AGENCIES' RESPONSIBILITIES UNDER SECTIONS 7(a) AND 7(c) OF THE ESA

SECTION 7(a) - Consultation/Conference Requires:

1. Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2. Consultation with the Service when a Federal action may affect a listed endangered or threatened species to ensure that any action authorized, funded, or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The process is initiated by the Federal agency after it has determined whether its action may affect (adversely or beneficially) a listed species; and

3. Conference with the Service when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or an adverse modification of proposed critical habitat.

SECTION 7(c) - Biological Assessment for Construction Projects *

Requires Federal agencies or their designees to prepare a Biological Assessment (BA) for construction projects only. The purpose of the BA is to determine whether any proposed and/or listed species are likely to be affected by a construction project and whether consultation/conference is required. A BA is required to include an evaluation of impacts to proposed species only when both listed and proposed species occur within the project area. Although the preparation of a BA is not required when only proposed species are present, it would assist the Federal agency in determining whether conferencing is required. The process is initiated by a Federal agency when that agency requests a list of proposed and listed threatened and endangered species. The BA should be completed within 180 days after its initiation (or within a mutually agreeable time period). If the BA is not initiated within 90 days of receipt of the species list, please verify the accuracy of the list with the Service. No irreversible commitment of resources is to be made during the BA process which would result in violation of the requirements under Section 7(a) of the Act. Planning, design, and certain administrative functions may be undertaken; however, the Federal agency cannot commit funds, issue licenses or permits, or carry out actions until the Section 7 process is completed.

To complete the BA, your agency or its designee should: (1) conduct an onsite inspection of the area to be affected by the proposal, which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population or potential reintroduction of the species; (2) review literature and scientific data to determine species distribution, habitat needs, and other biological requirements; (3) interview experts including those within the Service, National Marine Fisheries Service, State conservation departments, universities, and others who may have data not yet published in scientific literature; (4) review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; (5) analyze alternative actions that may provide conservation measures; and (6) prepare a report documenting the results, including a discussion of study methods used, any problems encountered, and other relevant information. Upon completion the report should be forwarded to our Endangered Species

---

* "Construction project" means any major Federal action which significantly affects the quality of the human environment (requiring an EIS), designed primarily to result in the building or erection of human-made structures such as dams, buildings, roads, pipelines, channels, and the like. This includes Federal actions such as permits, grants, licenses, or other forms of Federal authorization or approval which may result in construction.

KEYSTONE DEEPENING PROJECT

U.S. FISH AND WILDLIFE SERVICE RECOMMENDATIONS
and
CORPS OF ENGINEERS RESPONSES

RECOMMENDATION 1: Continue to investigate the possibility of beneficial uses of the dredged material, including the option of enhancing clam beds, and coordinate these plans with the service.

RESPONSE 1: Seattle district has made contact with Washington Department of Fisheries Shellfish Laboratory on the possible use of the dredged material for clamshell enhancement. The lab, after reviewing the material's grain size, determined it was too fine for use in enhancement of clamshell beds. The sandy material is also too fine for beach nourishment.

The dredged material is available for beneficial use as long as a sponsor comes forward and acquires pertinent permits and lands, if needed, pays any additional costs above the recommended plan and can meet the present dredging schedule (12/92).

APPENDIX B - PART 4

COMMENTS AND RESPONSES

APPENDIX B, PART 4

COMMENTS AND RESPONSES ON THE DRAFT DEFINITE PROJECT REPORT AND DRAFT ENVIRONMENTAL ASSESSMENT

The draft edition of this report was distributed for public and agency review on June 14, 1991, under the title "Draft Definite Project Report and Draft Environmental Assessment, Keystone Harbor Channel Deepening, Admiralty Inlet, Washington, May 1991." Comments were requested by July 15, 1991. The following letters were received as a result of the public review and are reproduced here with the Corps of Engineers responses.

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
ENVIRONMENTAL & TECHNICAL SERVICES DIVISION
911 NE 11th Avenue - Room 620
PORTLAND, OREGON 97232
503/230-5400 FAX 503/230-5435

JUL 11 199[illegible] F/NWR5:353

Mr. George W. Ploudre, P.E.
Chief, Planning Branch
Corps of Engineers-Seattle District
P.O. Box C-3755
Seattle, WA 98124-2255

Re: Keystone Harbor Channel Deepening Draft Definite Project Report and Draft Environmental Assessment.

Dear Mr. Ploudre:

The National Marine Fisheries Service (NMFS) has completed its review of the subject Draft Definite Project Report and Draft Environmental Assessment for Keystone Harbor Channel Deepening in Admiralty Inlet, Washington (report). Our comments are based on the NMFS's responsibility for the protection and enhancement of marine, estuarine, and anadromous fishery resources, and their supporting habitats.

B4-1

This draft report adequately addresses the proposed project's effects on the species within NMFS's jurisdiction. The measures stated to minimize the impact[illegible] species are sufficient.

Response: Comment acknowledged.

Thank you for the opport[illegible] review the draft report. If you have any questions regarding this letter, please contact Valerie Elliott, of my staff, at (503) 230-5432.

Sincerely,

Merritt E. Tuttle
Division Chief

cc: WDE
WDF
EPA
USFWS, Olympia

United States
Environmental Protection
Agency

Region 10
1200 Sixth Avenue
Seattle WA 98101

Alaska
Idaho
Oregon
Washington

EPA

Reply to
ATTN of: WD-128

AUG 19 1991

Mr. George W. Ploudre, P.E.
Chief, Planning Branch
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124-2255

ATTN: Joanne Green, Project Manager

RE: Keystone Harbor Channel Deepening Draft Definite Project Report and Draft Environmental Assessment, dated May 1991

Dear Mr. Ploudre:

Thank you for the opportunity to comment on the above referenced draft project report and draft environmental assessment (EA). We concur with the information presented in the report and EA with the following clarifications:

B4-2

(1) In the EA and report please specify pertinent windows for shrimp and salmon fisheries that impact the dredging and disposal schedule.

(2) Specify the Corps' efforts and findings on beneficial uses of project dredged material for hardshell clam habitat. We appreciate the efforts made by the Corps to be responsive to our earlier comments on this issue. If this alternative cannot be pursued in this project for technical reasons, please specify them in the EA and report.

Please contact Ms. Justine Smith (206) 553-4974 for additional coordination or with further questions.

Sincerely,

Justine D. Smith for

William M. Riley, Chief
Water Resources Assessment Section

cc: Ecology
DNR
WDF
WDW
USFW
NMFS

Response 1: Shrimp and salmonid closures are specified in the main report, section 4.12 a, in the EA, section 5 b, and in the Section 404(b)(1) Evaluation, appendix A1, section 11.4.

Response 2: Coordination on beneficial uses has been updated in the main report section 4.09 c and section 5.02 g and j. Briefly, the deepening material, principally silty sands, is too fine for clam bed enhancement and marginal for beach nourishment.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Fish and Wildlife Enhancement
3704 Griffin Lane SE, Suite 102
Olympia, Washington 98501-2192
206/753-9440 FTS 434-9440
FAX: 206/753-9008 FTS 434-9008

July 2, 1991

Colonel Milton Hunter
District Engineer
Attention: Linda Cox
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Hunter:

B4-3

The U.S. Fish and Wildlife Service (Service) has received and reviewed the May 1991 Draft Definite Project Report and Draft Environmental Assessment for the Keystone Harbor Channel Deepening, Admiralty Inlet, Washington. The Service has previously provided a planning aid letter and a draft Fish and Wildlife Coordination Act report for this project. Coordination of project planning with Corps biologists and other resource agency staff has continued and the Fish and Wildlife Coordination Act report will be finalized for inclusion in project planning documents by mid-August. The Service's concerns have been addressed in the Draft Project Report and Draft Environmental Assessment, and the following comments reflect minor recommendations to clarify the documents.

DRAFT DEFINITE PROJECT REPORT:

(1) Page 4. The draft report states that dredged material is routinely placed on the beach east of the breakwater. How often is this done? Is it on an annual basis?

(2) Page 19. A temporary reduction in waterfowl use of the harbor is predicted. Shorebird use should be included here as well.

(3) Page 21. This construction schedule may need to be altered to reflect the current planning schedule.

DRAFT ENVIRONMENTAL ASSESSMENT:

(4) We concur with the information presented in the draft environmental assessment.

Response 1: Maintenance dredging of shoaled material is done every 4 to 5 years, most recently in 1987. It is expected that the channel will again need maintenance work in late 1992. See Appendix D, section 1.05.

Response 2: Shorebirds are found in shallow intertidal areas where they feed. There is no intertidal habitat in the navigation channel itself and this type of habitat will not be affected by the deepwater dredging project.

Response 3: Submittal of the Final Report has been rescheduled to September 1991.

Response 4: Comment acknowledged.

DRAFT FINDING OF NO SIGNIFICANT IMPACT:

(5) We recommend that the Corps mention a few other terrestrial species, such as waterfowl and shorebirds, in addition to the discussion of benthic organisms and the threatened bald eagle.

These are the U.S. Fish and Wildlife Service's comments and recommendations for the Keystone Harbor Channel Deepening Draft Definite Project Report and Draft Environmental Assessment. If you have any questions or would like further information on these comments or the environmental documents that we have provided, please contact Dawn Whitehead at the letterhead phone/address.

Sincerely,

Nancy J. Gloman

Nancy J. Gloman
Acting Field Supervisor

dw/lk

c: EPA, Seattle (Smith)
NMFS, Portland (Elliott)
WDE, Olympia (McMillan)
WDF, Everett (Williams)
WDW, Mill Creek (Muller)

B4-4

Response 5: The FONSI text has been modified to include temporary disturbance to waterfowl during dredging.

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

Mail Stop PV-11 • Olympia, Washington 98504-8711 • (206) 459-6000

July 17, 1991

Ms. Linda Cox
Seattle District
U.S. Army Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124-2255

Dear Ms. Cox:

Thank you for the opportunity to comment on the draft environmental assessment for the Keystone Harbor Channel Deepening Project, Whidbey Island. Consistent with Ecology's responsibilities, we coordinated the review of this assessment with other state resource agencies. Comment letters from the Department of Fisheries and the Parks and Recreation Commission are attached for your information. Their comments, along with Ecology's concerns, are summarized below.

B4-5

Fisheries

(1) Comments from the Department of Fisheries indicate that clamshell dredging is the preferred method of dredging to reduce turbidity. They also identify the preferred time for dredging. Fisheries also recommends that dredge materials be used for beach nourishment east of Keystone Harbor.

Response 1: See responses to Department of Fisheries letter.

Parks and Recreation

(2) The Parks and Recreation Commission expressed concern that their previous comments were not addressed in the environmental assessment. Their earlier concerns related to the possibility of increased shoaling along the rock breakwater and wooden wave wall. They are also concerned about erosion along the sides of the basin and suggest that the "hour-glass" shape be narrowed slightly. They also suggest minor realignment of the channel to the east by 40 feet.

Response 2: See responses to letter from Parks and Recreation.

Ecology

The Department of Ecology comments are as follows:

(3) 1. Minimizing water quality impacts is desired and the proposed clamshell dredging is preferred.

Response 3: Comment acknowledged.

(4) 2. Beneficial uses, especially beach nourishment to the east of the breakwater, are encouraged. The established intertidal and subtidal communities on the riprap breakwater should be protected by placing material for beach nourishment far enough to the east and not directly over the breakwater. This will avoid impacts to the biota that serve as a major attraction for the State's underwater park.

(5) 3. The proposed project must be consistent with all applicable policies and other provisions of the Shoreline Management Act, its rules, and the local shoreline master program. This is required even if the project is found to be exempt from the substantial development permit requirements of the act.

If you have any questions, please call Mr. Brian Williams with Fisheries at (206) 339-3881, Mr. David Heiser with Parks at (206) 753-2016, Mr. Russ McMillan of the Environmental Review Section at (206) 459-6814, or Mr. Don Bales of the Shorelands Program at (206) 459-6762.

Sincerely,

Barbara J. Ritchie

Barbara J. Ritchie
Environmental Review Section

BJR:
91-3714

Attachment

cc: David Heiser, Parks
Don Bales, Shorelands
Linda Rankin, Shorelands
Russ McMillan, Environmental Review
Brian Williams, Fisheries

B4-6

Response 4: The maintenance dredging project, a separate action, will precede this deepening project and will dispose of its dredged material on the beach east of the breakwater as beach nourishment, as has been the practice for almost 30 years. Placement of the material to avoid impacts to biota at the underwater park has been coordinated in the past with Parks and the SCUBA diving clubs. The maintenance material will fill the site to capacity, so the material dredged from the deepening project will need to go elsewhere. The recommended plan calls for reserving the beach nourishment site for maintenance material and taking the deepening material to open water. So far, no sponsor for other specific beneficial uses has come forward for the deepening sediments.

Response 5: See Section 5.1 paragraph 4 of the EA where it is explained that under State of Washington law this Federal project is exempt from the Shoreline Management Program. The deepening project is, nevertheless, consistent with Island County's designation of the navigation channel as Urban. The surrounding shores, designated Conservancy, would not be impacted.

JOSEPH R. BLUM
Director

STATE OF WASHINGTON
DEPARTMENT OF FISHERIES
115 General Administration Building • Olympia, Washington 98504 • (206) 753-6600 • (SCAN) 234-6600

July 17, 1991

Mr. Russ McMillan
Washington Department of Ecology
St. Martin's Campus
Olympia, Washington 98504

Dear Mr. McMillan:

SUBJECT: Draft Environmental Assessment - Keystone Harbor Channel Deepening - Keystone Harbor, Tributary to Admiralty Inlet, Island County, SEPA Log Number 14324, WRIA 06.MARI

The Washington Department of Fisheries (WDF) has reviewed the above-referenced Draft Environmental Assessment and offers the following recommendations:

B4-7

1. Dredging activity in the Keystone Harbor be conducted with a clamshell to minimize turbidity impacts to adjacent marine habitats.

2. Dredging activity in Keystone Harbor be conducted between December 1 and March 14 to avoid shrimp impacts at the Port Townsend open water disposal site between September 1 through November 30 and juvenile salmon in Keystone Harbor between March 15 through June 15.

3. Maintenance dredge materials will be given priority for disposal at the beach nourishment site east of Keystone Harbor and will not be placed waterward of +8.0 tide elevation (MLLW = 0.00). Dredge materials placed at the beach nourishment site will be allowed to recruit to the beach waterward of the +8.0 tide elevation by natural processes only.

4. Beneficial use of the dredged materials will continue to be explored and coordinated with WDF.

If you have any questions concerning this response, please contact Brian Williams at (206) 339-3881.

Sincerely,

Brian Williams
Marine Habitat Manager
Habitat Management Division

Response 1: The recommended plan (channel deepening project) calls for clamshell dredging. However, maintenance dredging, a separate action, may still be done by either clamshell or hydraulic dredging.

Response 2: Dredging will be conducted to avoid the shrimp closure at the openwater disposal site, the juvenile salmonid closure period, and the summer tourist season at Fort Casey State Park.

Response 3: We agree to the priority of maintenance dredging materials for beach nourishment. We agree to place no fill beyond the original (pre-erosion) +8 foot elevation. Maintenance dredging will be the subject of a separate action for subsequent agency review.

Response 4: As you know, we have been coordinating with Fisheries staff at Point Whitney lab on possible use of deepening sediments for enhancement of clam beds. We have been advised that the sediments to be dredged, mostly silty sands, are too fine to serve well for this use.

RECEIVED

JUL 15 1991

IAN TVETEN
Director

STATE OF WASHINGTON

WASHINGTON STATE PARKS AND RECREATION COMMISSION

7150 Cleanwater Lane, KY-11 • Olympia, Washington 98504-5711 • (206) 753-5755

July 9, 1991

To: Barbara Ritchie, NEPA Coordinator
Dept. of Ecology

From: David W. Heiser, E.P., Chief, Environmental Coordination

Subject: 35-358-27 (E-8404) Draft Definite Project Report and Draft Environmental Assessment: Keystone Harbor Channel Deepening. Fort Casey State Park Impacts.

B4-8

The staff of the Washington State Parks and Recreation Commission has reviewed the above noted document and wishes to make the following comments.

In December 1990, I sent the US Army Corps of Engineers a letter outlining specific concerns and recommendations this agency had regarding Keystone Harbor Channel Deepening. I expected to see those concerns and recommendations addressed in the Draft Environmental Assessment (EA). They were not. In fact, the document infers that the decision has already been made regarding the proposal and that the questions I had raised early on in the study process were either insignificant or invalid. My question now is, what is the purpose of a "coordinated study" process if the concerns raised are not addressed in the Draft EA? I believe the concerns and recommendations I have raised are valid and directly influence how the project will affect facilities under the management and control of the Commission.

Attached for your review is a copy of the correspondence I sent to the Corps for consideration in developing the Draft EA. It is my understanding they will address it in the final EA.

H:\WP51\KEYSTONE.CWT

Attachment

Response: The points raised by Mr. Heiser were discussed with him during the interagency meeting of November 28, 1990. After receipt of the December letter from Parks, Corps staff from Operations Division, Civil Design Section, and Study Management considered the Parks recommendations to see if any change should be made in the recommended plan. We concluded that, for the reasons detailed in specific responses herein, no change should be made, and the letter would be answered as part of the response to comments on the draft report. It would have been better if we had coordinated this earlier with Parks and we have apologized for not doing so.

cc: Vic Yoshino, CofE Seattle
Alex Sumeri, CofE Seattle
Joanne Green, CofE Seattle
Russ McMillan, DOE
Mike Morton, Island Co. Planning Dept.
T.J. France, WSP&RC, Asst. Dir., Resources Development
Dennis Smith, WSP&RC, Asst. Dir., Operations
Kris Kauffman, P.E., WSP&RC, Chief, Engineering
Terry Doran, WSP&RC, Region 2 Supervisor
Ken Hageman, WSP&RC, Park Manager, Fort Casey State Park
Dennis Swanson, WSP&RC, Marine Maintenance Engineer
John Purcell, WSP&RC, NWWO, Environmental Coord.

JAN TVEITEN
Director

STATE OF WASHINGTON

WASHINGTON STATE PARKS AND RECREATION COMMISSION

7150 Cleanwater Lane, KY-11 • Olympia, Washington 98504-5711 • (206) 753-5755

December 13, 1990

Re: 35-358
Fort Casey State Park -
Keystone Harbor
Channel Deepening
Feasibility Study

Ms. Joanne Green
Study Manager
Plan Formulation Section
Department of The Army
Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Ms. Green:

Thank you for providing an opportunity for us to be aware of your proposal. Obviously, the project will have both adverse and beneficial effects and we appreciate the chance to present our concerns.

Channel Deepening

Specifically, as I related at your November 28 meeting, we are concerned about:

1. The possibility of increased shoaling along the rock breakwater and wooden wave wall near the boat launch. We are experiencing a gravel buildup around the south side of the wooden wave wall which then passes through the fish passage holes in the wall and is deposited on the southerly launch lane.

   This has gotten much worse in recent years with use of the larger ferries and we believe it may get worse with the deepening project if it allows the ferries to approach even faster than they do now, with the consequent need to reverse thrust more forcefully near the launch ramp.

B4-10

Response 1: We do not anticipate any change in shoaling, but any change that did occur would be a reduction in material being carried to the east side of the entrance channel and onto the launch ramp. The northward transport of material on the east side of the channel is caused primarily by wind waves and tidal currents. We do not believe ferry propeller wash has a significant effect on the transport of material in this area.

2. We believe that more of the dredged spoils should be located on the disposal area east of the rock breakwater where it can provide beach feeding. Despite assurance from Alex Sumeri to the contrary, our Chief Engineer Kris Kauffman, Park Manager Ken Hageman and I are all in total agreement that we need more "sacrificial beach" between our comfort station and the high tide line. In 1987 we got down to something slightly in excess of 20 feet from the corner of the building to the edge of the eroded shoreline.

   An alternative is for the Corps to provide written assurance that it will be responsible to perform emergency construction to prevent catastrophic failure of our building.

   Another thought is that the Corps could construct a more substantial "beach berm" that can be pushed over the edge, providing some sacrificial beach material.

   The primary reason for our concern is that periodic dredging intervals may change with the deeper channel and we are concerned about a lack of beach feeding at a critical juncture several years from now. I am also concerned that the Department of Transportation (DOT) is and has been dumping dredged material at deepwater sites. I believe this will eventually disrupt beach building processes on Keystone Spit if allowed to continue. We must remember that this project is relatively recent, being built in 1948. I believe the Corps is obligated to ascertain the net transport on Keystone Spit, prior to allowing deepwater disposal.

3. Should further analysis indicate gravel and sand resource will be available for deepwater disposal, we suggest instead utilization for beach feeding or shellfish enhancement be seriously considered.

   I have discussed this with Mr. Richard Burge, Manager, Washington Department of Fisheries Shellfish Laboratory at Brinnon. Dick is responsible for an aggressive enhancement plan to increase shellfish stocks in Puget Sound and Hood Canal. One method to enhance the resource utilizes a layer of gravel/sand over muddy substrate with tilling or mixing to result in improved clam habitat.

B4-11

Response 2: The beach nourishment procedure coordinated with Parks, other agencies, and the SCUBA diving clubs to preserve the beach without harming the adjacent underwater park has worked well. For nearly 30 years the shoaled material dredged from the channel has balanced that eroded at the beach nourishment site. As you know, the Corps of Engineers shared equally with you the cost of constructing recreation facilities at Keystone Harbor including the comfort station, so we are as concerned as you that the building not be undermined. However, we do not see that it is in danger. Furthermore, there is a limit to how much material can be stockpiled at the site. If it is overstocked, there will not be enough room for subsequent maintenance material. In 1981 the Corps removed a stockpile in response from local citizens that the pile was obstructing view property and the view from a local restaurant. However, every effort will be made to maximize nourishment with maintenance material. When DOT dredged one barge load of material from some high spots in the channel in February 1989, the material was taken to an upland site because chemical testing of one of the sediment samples slightly exceeded the screening level for one hydrocarbon of concern, phenol. In 1983, DOT widened and deepened the harbor and took the dredged material to open water. We had reviewed the DOT proposal and determined that added material over normal maintenance of the beach east of the breakwater was neither required nor appropriate in light of the 1981 problem with the stockpile.

Concerning the net transport at Keystone Spit, see discussion in appendix D, section 2.06, Effects on Adjacent Shorelines. This discussion is backed by years of experience with channel shoaling and beach erosion as monitored regularly by condition surveys.

Response 3. Since January of 1991 we have been coordinating with Fisheries staff at the Brinnon lab. We have been advised that the deepening material is not suitable for their clam bed enhancement program, being too fine. We are open to providing the deepening material for beneficial uses provided a sponsor comes forward to pay any additional cost, pursue the necessary approvals, and do this without delaying the completion of the project.

I have copied Mr. Burge with your proposal and drawing. Please add him to your mailing list:

Richard Burge, Manager
Department of Fisheries
Point Whitney Shellfish Lab
1000 Point Whitney Road
Brinnon, WA 98320

Maintenance Dredging

Several aspects of ongoing maintenance are of concern to State Parks:

(4) 1. Recent dredging (1987) resulted in removal of several boat launch slabs from the end of the launch ramp. We presently have a drop-off at the end of the concrete ramp, causing a liability concern at low tide periods.

(5) We suggest that the "hour-glass" shape be narrowed slightly at this time so that the -18 channel is a little farther off the sides of the basin. We continue to experience erosion along the sides of the basin which I believe is directly due to the over-steepened inter-tidal area. Please see the marked up drawing for my suggested narrowing. If the ferry would be adversely impacted, it would have to be due to loss of power or some other failure and grounding would be imminent.

(6) 2. We would like to see a minor realignment of the 200 foot channel (see our drawing) to the east by about 40 feet. This will remove some of the shoaling along the rock breakwater and give DOT a wider approach width.

(7) 3. I am also providing Vic Yoshino with a separate copy of my response together with a copy of an earlier Corps drawing showing the location of ferry pilings. This may be a useful clue to the phenols you found in one sample. I will copy DOT's Warren Johnson also.

(8) Please keep us informed of each stage of the process. This Corps work and DOT's use of the Harbor has profound impacts upon our management and the use by thousands of boaters each year. Further, I believe it is essential the Corps establish the beach transport process and quantities prior to authorizing deepwater disposal.

B4-12

Response 4, Maintenance Dredging. Your comment about removal of boat launch slabs is noted. Should the dredging contractor establish a temporary offloading dock on the east side of the channel, care will be taken to keep operations away from the boatlaunch ramp.

Response 5. The northeast corner of the basin will likely continue to shoal very slowly from sloughing of the channel slopes. During the 1987 maintenance dredging rehandling operation we purposely restored part of this bank. In the future we will minimize maintenance activities in this area.

Response 6. A decision was made not to pursue channel widening as a part of the deepening project for the reasons stated in section 3.06 of this report.

Response 7. Thank you for information on the temporary pilings. This relates to test results from a sediment sample taken from outside the Federal navigation channel in 1988. As you know, testing of samples taken from within the channel in December 1990 showed no chemicals of concern present in concentrations above the PSDDA screening levels and the materials are suitable for openwater disposal.

Response 8. We will coordinate with you on any changes to the deepening plan or maintenance dredging routine. We are well acquainted with the beach transport process at Keystone Harbor. Maintenance dredging quantities will be determined when surveys are conducted in the spring of 1992. At that time we will know more exactly how much material can be taken to the beach nourishment site and how much must be taken to open water.

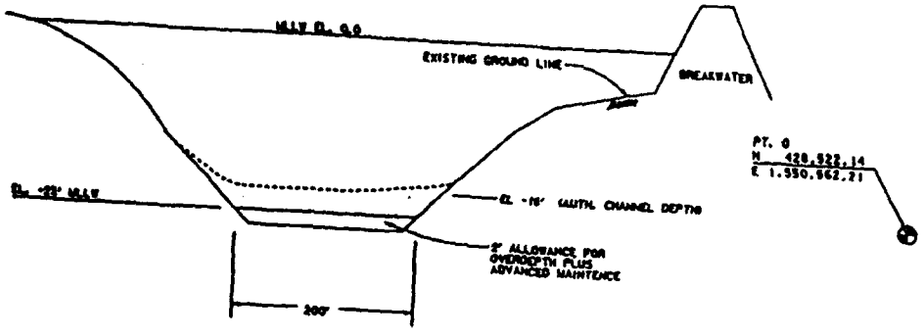
Please feel free to contact me at (206) 753-2016 if you have any questions.

Sincerely,

David W. Heiser

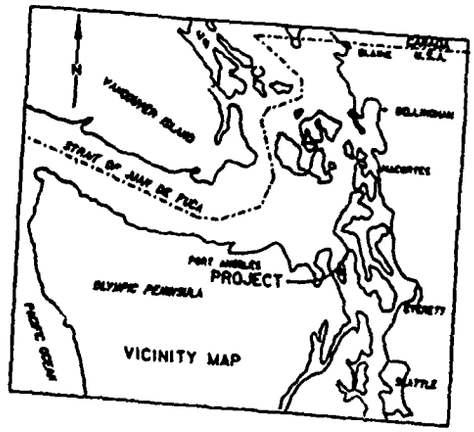
David W. Heiser, E.P., Chief
Environmental Coordination

bh
Enclosures
cc: Vic Yoshino, CofE Seattle
Alex Sumeri, CofE Seattle
Russ McMillan, DOE
Dick Burge, WDF Brinnon
Brian Williams, WDF
Ted Muller, WDW
John Malek, EPA, Region X Seattle
Dawn Whitehead, USFWS Olympia
Merritt Tuttle, NMFS Seattle
Warren Johnson, WDOT
Mike Morton, Island County Planning Department
T. J. France, WSP&RC
Lynn Genasci, WSP&RC
Kris Kauffman, WSP&RC
Terry Doran, WSP&RC, Region 2 Supervisor
Ken Hageman, Manager, Fort Casey State Park
Dennis Swanson, WSP&RC, Marine Maintenance Engineer
John Purcell, WSP&RC, NWWO



TYPICAL CROSS SECTION

NOT TO SCALE



- AREA TO DELETE FROM MAINTENANCE DREDGING
- ADDITIONAL AREA TO BE DEEPENED 40' X 950'

CONDITION, MAY 1987

U.S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

KEYSTONE HARBOR
SECTION 107 CHANNEL DEEPENING STUDY

LAKE CROCKETT

90 SEP 20

ISLAND COUNTY PLANNING DEPARTMENT

P.O. Box 5000
Coupeville, Washington
98239-5000

LARRY KWARSICK
Planning Director

PHONE: 206/679-7340
FROM CAMANO 629-4522
FROM S. WHIDBEY 321-5111
SCAN: 582-7339

June 19, 1991

Mr. George Ploudre
Department of the Army
Seattle District Corps of Engineers
P.O. Box 3755
Seattle, Washington 98124-2255

RE: Keystone Harbor Deepening project

Dear Mr. Pleudre:

Thank you for the opportunity to comment on draft project report and environmental assessment for the Keystone Harbor Channel Deepening project. Island County fully supports the proposed deepening of the channel. We believe the project will benefit the residents of Island County as well as tourists and travellers passing through on State Route 20.

Sincerely,

Larry Kwarsick
Planning Director

B4-15

Response: Comment acknowledged.

City of Oak Harbor
3075 300 AVENUE WEST
OAK HARBOR, WASHINGTON 98277
(206) 679-5551
OFFICE OF THE MAYOR
AL KOETJE
MAYOR

7/15/91

July 9, 1991

Milton Hunter
Colonel, Corps of Engineers
Seattle District
P. O. Box C-3755
Seattle, Washington 98124-2255

B4-16

Dear Colonel Hunter:

Thank you for the opportunity to comment on the project report and environmental assessment for the Keystone Harbor Channel Deepening project. The City of Oak Harbor wishes to go on record as supporting the project. We believe deepening the channel to make Keystone accessible at low tide is in the best interest of the public and would generally benefit ferry users who must deal with delays, inconvenience and extra cost.

From reading your findings, this project appears to be environmentally safe and would not cause undue damage to the shoreline and tidelands.

Very truly yours,

Al Koetje
Mayor

AK:BW

cc: Mr. Gordon Koetje, Chairman
Island County Board of Commissioners

Response: Comment acknowledged.

Naval Air Station Whidbey Island (NAS Whidbey):

On July 11, 1991, Steven Rothboeck, Natural Resources Planner for the Environmental Affairs Office, telephoned the Corps Study Manager to report that, since the deepening project will not impact the shoreline, particularly a Navy tower on the west shore of the harbor, NAS Whidbey has no comment on the report.

Thirteenth District, U.S. Coast Guard:

LT. Marsh of the 13th District Planning Office spoke by telephone to the Corps Study Manager on July 16, 1991, to report that since no new aids to navigation will be installed at Keystone Harbor as a part of the deepening project, the Coast Guard has no comment on the report.

APPENDIX C

ECONOMIC ANALYSIS AND COST SHARING

SECTION 1

Economic and Social Environment

1.01 Project Location

Keystone Harbor is located on the west-central shore of Whidbey Island, in Island County, Washington. Keystone is situated on the eastern side of Admiralty Inlet at the entrance to Puget Sound and about 4 nautical miles via ferry from Port Townsend, about 30 road/ferry miles northwest of Everett, and 50 road/ferry miles north of Seattle. Whidbey Island is connected to the mainland by a bridge over Deception Pass to the north and by ferry service at Keystone and at the south end of the island at Clinton.

1.02 Topography and Land Resources

Island County consists of 137,500 acres, or about 206 square miles, and is comprised of Whidbey and Camano Islands. The terrain is rolling with higher hills ranging from 400 to 500 feet above sea level. Island County is about 65 percent forest land, 16 percent farmland and 19 percent urban. The main resources of Whidbey Island are its forests, farmlands and over 200 miles of scenic shoreline. Most of the island's non-government industry has developed from these resources.

1.03 Climate

The climate of the area is temperate, with cool dry summers and mild winters. The mean temperature ranges from 39.5 degrees F. in January, to 71 degrees F. in August. Annual rainfall on Whidbey Island averages 20 inches. Surrounding waters have an average temperature of about 48 degrees in winter and 55 degrees in summer. Local prevailing winds are westerly/southwesterly during the fall and winter and westerly/northwesterly during spring and summer. Due to the influence of the Strait of Juan de Fuca and surrounding Cascade and Olympic mountains, local winds are often strong.

1.04 Population Characteristics

In 1980, the population of Island County was 44,048, and by 1990 the population had grown to an estimated 59,200. This represents an average growth rate of 3.0% per year. Since 1985, the population of Island County has grown at an average growth rate of 3.77% per year. In comparison, state population has grown at 1.5% per year between 1980 and 1990 and at 1.82% per year between 1985 and 1990. Compared to a Washington State average population density of 72 people per square mile, the average number of people per square mile in Island County is relatively high at 287. See table 1-1 for data on population trends in Island County and Washington State.

Table 1-1

POPULATION TRENDS OF ISLAND COUNTY AND WASHINGTON STATE

	Population	
Year	Island County	Washington State
1980	44,048	4,132,353
1981	45,200	4,250,200
1982	46,000	4,264,000
1983	47,000	4,285,100
1984	47,800	4,328,100.
1985	49,200	4,384,100
1986	50,600	4,419,700
1987	52,100	4,481,100
1988	53,400	4,565,000
1989	55,300	4,660,700
1990	59,200	4,798,100
Average Annual Growth Rate - %		
1980 - 1990	3.00	1.50
1985 - 1990	3.77	1.82

Source: *1990 Population Trends For Washington State, Office of Financial Management, August 1990.*

1.05 Economy

The single largest employment sector in Island County is the Federal, state and local government. Including military servicemen, this sector represents over 66 percent of total county employment. This is primarily the result of the Naval Air Station, Whidbey Island, located 5 miles to the north of Keystone at Oak Harbor, which employs numerous civilian and military servicemen. The largest non-government employment sector is the retail trade industry, at 12 percent of total county employment. In 1979, Island County per capita income was $7,108 and by 1985 was $10,058 - an increase of 42 percent. This compares to a state per capita income of $8,073 in 1979 and $10,866 in 1985.

SECTION 2

Economic Evaluation

2.01 Problem and Need

The Washington State Department of Transportation has requested the Corps of Engineers to evaluate the feasibility of deepening the Federally maintained navigation channel in Keystone Harbor. The Washington State Ferry System (sub-agency of the Department of Transportation) operates a car/passenger ferry run between Port Townsend, Washington and Keystone Harbor, Washington. Traffic on this route has increased substantially resulting in the ferry system assigning larger vessels than previously used on this route. While these vessels can carry more vehicles and passengers, they also have deeper drafts, which during tide events of -2.5 or lower in Keystone Harbor, results in the suspension of ferry service on this run. The problem is most critical during summer months when car/passenger traffic is at its peak and daytime low tides are at their lowest levels - which can be as low as -4.5 feet. Sufficient deepening of the channel would eliminate these cancellations.

2.02 Without Project Conditions

The without project condition is the most likely condition expected to exist over the life of the project (1993-2043) in the absence of the proposed project. The currently authorized Federal channel depth is -18 feet MLLW. In early 1989, the Department of Transportation dredged the channel to about -22 feet. During 1989, the Ferry System tried bringing vessels into Keystone at -2.5 and lower tides. However, even though the channel was deeper than the authorized depth, ferry captains were still experiencing propeller cavitation and associated steering problems at low tides and consequently, did not consider the channel deep enough to safely enter Keystone Harbor whenever tides drop to -2.5 feet or lower. Accordingly, ferry trip cancellations began again in 1990 and will continue into the future whenever tides drop to -2.5 or lower.

The without project condition included the following assumptions: (1) 1988 was a typical vessel cancellation year, (2) any replacement ferries on this route would be of similar physical dimensions as existing ferries, (3) passenger traffic will remain at least at 1988 levels over time, and (4) the extreme west side of the channel, where almost all of the littoral drift shoaling occurs, will continue to be maintained at -18 feet. As a result of this dredging, the remaining portion of the channel where critical ferry maneuvers occur, will remain at the depth of last deepening or -22 feet.

2.03 With Project Condition

The with project condition is the condition expected to exist over the period of analysis if the project is undertaken. Benefits of the proposed channel improvements are equal to the value

of opportunity costs of ferry passenger delay as measured between the with and without project condition. The with project condition included the same assumptions as those in paragraph 2.02.

2.04 Existing and Future Keystone Harbor Ferry Fleet

Currently, there are two ferries serving the Keystone Harbor-Port Townsend run. These vessels are the M.V. Nisqually and the M.V. Klickitat. The physical dimensions of these vessels are shown below in table 2-1.

Table 2-1

PHYSICAL DIMENSIONS OF VESSEL FLEET

Vessel Name	Overall Length	Beam	Loaded Draft	Vessel Speed (Knots)	Vehicle Capacity of Ferry
M.V. Nisqually	256 ft	74 ft	13.5 ft	12	75
M.V. Klickitat	256 ft	74 ft	13.5 ft	12	75

Based on discussions with the Washington State Ferry System representatives, these vessels are expected to remain on this run over the foreseeable future. Any replacement vessels are expected to be of similar size and speed.

2.05 Underkeel Clearance

Underkeel clearance refers to the distance between the keel of a ship and the channel bottom. The greater the clearance, the lower the risk a vessel will lose steering or accidently strike the channel bottom. Factors which affect the underkeel clearance of non-moving vessels are: channel depth, tide elevation, and vessel draft. Channel depth and tide elevation determine the amount of water in a channel; subtracting the vessel draft from this sum determines how much water remains under the keel of a stationary ship. The Captains of the Washington State Ferry System are responsible for safely navigating these vessels into and out of Keystone Harbor. When the Captains on this run have experienced insufficient underkeel clearance it has resulted in propeller cavitation, loss of forward rudder control and loss of reverse thrust. In other words, insufficient underkeel clearance results in the loss of steering and speed control on these vessels. See paragraph 2.07 for more information on vessel operation when entering Keystone Harbor. Captains operating ferries on the run have stated that the minimum acceptable underkeel clearance for non-moving ferries is 7 feet as anything less will result in continued vessel cancellations. Given the above, the economic benefit analysis incorporated a without and with project minimum underkeel clearance requirement of 7 feet.

2.06 Vessel trips and Cancellations

During the spring and summer months, when most cancellations occur, vessels begin their runs at 7:00 a.m. and finish about 9:30 p.m. Crossings, including docking time, take 30 minutes and during high demand periods ferries normally depart Port Townsend and Keystone every 45 minutes. During week-ends there are typically 17 scheduled one-way trips while on week-days there are normally 10 scheduled one-way trips (except Mondays which have 15 one-way trips). Each ferry has a 75 vehicle capacity rating and are normally full during peak demand periods. In 1988, the ferry system experienced 84 one-way cancellations between May 4 and July 30 and an additional 8 one-way cancellations between November 23 and December 10.

2.07 Vessel Operating Procedures

The entrance to Keystone Harbor is 1000 feet long and 200 feet wide (including 50 feet of advanced maintenance) and is considered to be the most difficult landing in the Washington State Ferry system. For example, during the spring and summer months these vessels are usually loaded to full or near full capacity and draw about 13.5 feet of water. Because of strong currents just outside of Keystone Harbor as well as prevailing winds, these vessels must be moving at full or near full speed of about 12 knots in order to safely enter the channel. Due to the currents just outside the entrance, these vessels cannot begin to slow down until the entire vessel is inside the protected portion of the channel. In order to slow down in time to safely approach the dock, vessel propellers are placed into full reverse. If the distance between the vessel and channel bottom is insufficient during this maneuver, water pressure abnormalities can result creating propeller cavitation, loss of forward rudder control and reverse thrust during a critical point in the docking maneuver. For these reasons, ferry captains will not enter Keystone Harbor when tides reach -2.5 feet or lower.

2.08 Benefit Methodology

Benefits were based on 1988 ferry trips that were cancelled due to low tide and were computed by determining the time saved per vehicle as a result of the project and multiplying by the number of vehicles delayed, times the average number of people per vehicle, times the opportunity cost of delay for business or leisure travelers. If not all delayed vehicles could be serviced by the first ferry after cancellation, the remaining overflow was assumed to be serviced by the next ferry that could accommodate them.

a. Time Saved Per Vehicle - People who ride the ferries are delayed in reaching their destination when scheduled vessel trips are cancelled. They have the choice of waiting for the first available ferry, driving to their destination, or cancelling their trip. The average wait time between when a person was scheduled to depart on a ferry and when the person did depart was estimated at 1.9 hours. Maximum wait time was estimated at 4 hours. Time required to drive from Port Townsend to Keystone (or vice versa) via Clinton-Mukilteo and Edmonds-Kingston ferries (quickest alternative route) was estimated

at 3.5 hours. This data indicates that most people would rationally chose to either wait for the next available ferry or cancel their trip. Data was not available to indicate how many people cancelled their trip. As a result, benefits associated with people cancelling their trips were not quantified.

Time saved as a result of the project was computed for each of the 92 one-way ferry trip cancellations. Vehicles were assumed to arrive linearly over time. Project related time saving was measured based on the time lapsed from when the vehicle would have departed on a ferry until the vehicle could depart on a ferry. Project related time saving per vehicle ranged from .45 hours to 4.0 hours. See table 2-2 for example of how time saved per vehicle was computed.

b. Number of Vehicles Delayed - Number of vehicles delayed was determined using ferry ticket sales. For example, if there were 3 trip cancellations in a row, 112 vehicle tickets sold for the next departing ferry, and assuming vehicles arrive linearly over time, then 112 tickets would be divided by 4 (3 cancelled trips plus first departing trip after the trip cancellations) to determine the number of vehicles allocated to each trip ($112 \div 4 = 28$). The first ferry departing after the cancelled trips was assumed to be loaded until it could accommodate all waiting vehicles or until it reached its capacity of 75 vehicles, whichever came first. If not all vehicles could be accommodated on this first departing ferry, the remaining vehicles or overflow would be loaded onto the following departing ferry. See Table 2-2 for example of time saved per vehicle and number of vehicles delayed per trip.

Table 2-2

EXAMPLE OF TIME SAVED PER VEHICLE
PLUS NUMBER OF VEHICLES DELAYED PER TRIP

Cancelled Ferry Run	Actual Ferry Departure	Number of Vehicles 1/	Net Time Delay (hrs)
10:45	14:45	28	4.00
12:30	14:45	28	2.25
13:15	14:45	19	1.50
	Ferry at Capacity =	75	
Vessel Overflow			
13:15	16:00	9 2/	2.75
14:45	16:00	28 3/	1.25
	Total Vehicles =	112	

1/ *112 vehicles divided by 4 (i.e. 3 cancelled trips plus next non-cancelled trip).*

2/ *Vehicles which arrived to catch 13:15 ferry departure but had to wait until 16:00 departure because 14:45 departure was at capacity.*

3/ *Vehicles which arrived to catch 14:45 ferry departure but had to wait until 16:00 departure because the 14:45 departure was at capacity.*

c. Average Number of People Per Vehicle - This component was determined for each month there were vessel cancellations by dividing the total passengers riding the ferry that month by the total number of vehicles transported by the ferry system to and from Keystone Harbor over the same time frame. 1/ The average number of people per vehicle ranged from 2.2 people in May, to 2.3 people in June, to 2.7 people in July. The winter months of November and December averaged 2.2 people per vehicle.

d. Opportunity Cost of Delay - Draft ER 1105-2-100 dated 15 December, 1989 states the opportunity cost of delay (OCD) should be based on the economic activity of the people delayed. For business travelers the after tax wage rate should be used as the OCD. For adult leisure/recreational travelers, the OCD can be assessed at 1/3 the before-tax wage rate, while for children, the OCD can be assessed at 1/4 the adult rate. For this study it was assumed that all people traveling during Monday-Thursday were business people, all people traveling on Saturday-Sunday were recreational travelers en-route to their recreational site and people traveling on Friday were 1/2 business people and 1/2

recreational. On the days that recreational travelers were using the ferry, it was assumed that each recreational vehicle carried an average of 2.0 adults and the portion over 2.0 represented the average number of children. That is, if the average number of people per vehicle was 2.7, the vehicle was assumed to consist of 2.0 adults and .7 children. The after-tax hourly wage rate was determined for both Jefferson County (Port Townsend) and Island County (Keystone) and averaged to determine a representative OCD for business people traveling between these two communities. The after tax hourly wage rate for Jefferson County was estimated at $6.90 and for Island County it was estimated at $6.60. 2/ The average hourly wage rate for business travelers was estimated at $6.75 and was used as the OCD for business travelers. Based on this rate, the hourly OCD for adult leisure time was estimated at $2.64 and the OCD for children was estimated at $.67.

e. Benefit Computation

Benefit Computation Example - Project related time savings were computed for each ferry trip cancellation and quantified by determining project related time savings per person and multiplying times the number of people times the opportunity cost of delay. See Table 2-3 for example of how the OCD benefit was computed.

1/ *Source: Washington State Ferry System ticket sales data.*

2/ *Wage rates were based on "Employment and Payrolls in Washington State by County and Industry," Washington State Employment Security, dated July, 1990.*

Table 2-3

EXAMPLE OF OPPORTUNITY COST OF DELAY BENEFIT COMPUTATION

(1) No. of Vehicles	(2) Total # of People 1/	(3) Total Time Delay (Hrs) 2/	(4) Total Time Lost (Hrs)	(5) Hrly Value of OCD - Business	(6) OCD Benefit
28	76	4.00	304	$6.75	$2,052
28	76	2.25	171	6.75	1,148
19	51	1.50	76	6.75	516
9	24	2.75	66	6.75	446
28	76	1.25	95	6.75	640
					Total $4,802

1/ *Column 1 times an average of 2.7 people per vehicle.*

2/ *From Table 2-2 - Column 4.*

2.09 Incremental Channel Depth Analysis

Improvements to the channel depth will result in decreased vessel trip cancellations. Based on vessel draft, underkeel clearance, low tide elevation (beginning at depths of -2.5 and lower) and waterway depth, benefits were computed for applicable waterway depths ranging from 23 to 26 feet. A channel depth of -23 feet would accommodate vessels with drafts of 13.5 feet, a 7 foot underkeel clearance and tides to as low as -2.5 feet (13.5 feet + 7 feet + 2.5 feet = 23 feet). Benefits for this depth reflect those cancellations that would have occurred when tides dropped to -2.5 feet, but eliminated if the channel were dredged to 23 feet. A -24 foot channel depth would eliminate those cancellations which would have occurred when tides range between -2.5 and -3.5 feet. A -25 foot channel depth would eliminate vessel cancellations which would occur when tides range between -2.5 and -4.5. Since the maximum low tide is -4.5 feet, benefits for a -26 foot channel are the same as the -25 foot channel. Shown below in table 2-4 are OCD benefits associated with each applicable channel depth.

Table 2-4

OPPORTUNITY COST OF DELAY BENEFITS BY PROJECT DEPTH

Channel Depth	Average Annual Benefits
23	$11,000
24	31,000
25	70,500
26	70,500

2.10 Project Costs

a. First Costs and Investment Costs - First costs were estimated for dredging the navigation channel to various depths. Costs include dredging and dredged material disposal and are in October 1990 prices. Investment costs include project first costs plus interest during construction (IDC). IDC was computed by compounding interest on project first costs over the construction period at 8-3/4 percent interest.

b. Annual Costs - Estimated annual costs are based on investment costs levelized over the 50-year economic life of the project at 8-3/4 percent. Operation and maintenance costs were not expected to increase as a result of the proposed project.

Shown below in Table 2-5 is a summary of project first costs, investment costs, and annual costs by project depth.

Table 2-5

SUMMARY OF PROJECT FIRST COSTS, INVESTMENT COSTS, AND ANNUAL COSTS

First Costs ($000)	Channel Depth			
	23 ft.	24 ft.	25 ft.	26 ft.
Project First Cost	$235	$284	$343	$400
Interest During Const.	2	2	3	4
Investment	$237	$286	$346	$404
Annual Costs ($000)				
Interest and Amortization (50-years @ 8-3/4%)	$21	$26	$31	$36
Operation and Maintenance	0	0	0	0
Total Annual Cost	$21	$26	$31	$36

2.11 Project Maximization and Benefit-Cost Summary

The purpose of project maximization is to determine the optimum project depth which is defined as the depth where net benefits (benefits minus costs) are the greatest. As shown in table 2-6, benefits in excess of costs are at their maximum at a channel depth of 25 feet. Benefit-cost ratios were computed for each project depth in order to determine which project depths were economically justified. A summary of the economic analysis to include project benefits, costs, net benefits and benefit-cost ratios, by project depth, is shown in table 2-6.

Table 2-6

SUMMARY OF ECONOMIC ANALYSIS

Waterway Depth (Feet)	Average Annual Benefits	Average Annual Costs	Total Net Benefits	Benefit-Cost Ratio
23	$11,000	$21,000	$-10,000	.52 to 1
24	31,000	26,000	5,000	1.2 to 1
25	70,500	31,000	39,500	2.3 to 1
26	70,500	36,000	34,500	2.0 to 1

2.12 Cost Sharing

Cost sharing of the estimated full funded construction costs was conducted in accordance with cost apportionment requirements of the Water Resource Development Act of 1986, Public Law 99-662 as amended. The local sponsor of this project is the Washington State Department of Transportation. A local cooperation agreement (LCA) between the Department of the Army and local sponsor will be signed to ensure that local cost sharing requirements are met. Cost sharing requirements are as follows:

a. The local sponsor shall provide at no cost to the Government all lands, easements, rights-of-way, relocations, and dredged material disposal areas (LERRD), determined by the Government to be necessary for construction, operation and maintenance of the project.

b. Effective December 1989, an agreement between the Corps of Engineers, Environmental Protection Agency Region 10, and the Washington State Department of Ecology and Natural Resources (DNR) was established on sites and procedures for open water disposal of dredged sediments in the Puget Sound area of Washington state. The agreement is presented in the "Management Plan Report, Unconfined Open water Disposal of Dredged Material, Phase I (Central Puget Sound)" dated June 1988 and "Phase II (North and South Puget Sound)" dated September, 1989. As part of the PSDDA planning process, it was determined that a disposal fee would be charged by DNR for dumping at the prescribed disposal site. For Federal navigation projects, this fee would be paid by the local sponsor where a sponsor exists. Where there is no sponsor, (e.g. Duwamish Waterways, Swinomish channel, etc.) no fee would be charged. For the Keystone Harbor deepening project, the project sponsor will be responsible for paying to DNR the PSDDA fee for using the Port Townsend openwater disposal site. This fee is currently $.40 per c.y. of material deposited and is payable at the time of disposal.

c. For commercial navigation projects, Public Law 99-662 requires the sponsor to provide a cash contribution equal to the following percentages of the total cost of constructing general navigation features of the project. Since this project has less than a one year construction period, these funds must be provided by the sponsor to the Federal Government prior to the start of construction contract award.

(1) Ten percent of the costs attributable to the portion of the general navigation features of the project which has a depth not in excess of 20 feet. Given the current channel depth of -22 feet, shoaling rate, and channel deepening occurring concurrently with or shortly after maintenance dredging, all general navigation costs were assumed to be cost shared based on a channel depth in excess of 20 feet but not in excess of 45 feet as shown in paragraph 2.12c(2) below. If during project construction any material associated with channel deepening is dredged between -18 through -20 feet, that cost will be cost shared at 10 percent local sponsor and 90 percent Federal Government.

(2) Twenty-five percent of the cost attributable to the portion of the general navigation features of the project which has a depth in excess of 20 feet but not in excess of 45 feet.

d. The local sponsor, at his option, shall either repay without interest, a lump sum at the end of construction and within 90 days of final accounting or in annual installments with interest over a period not to exceed 30 years following completion of the project or separable element thereof, an additional 0 to 10 percent of the total cost of constructing general navigation facilities. The actual percentage paid depends on the value of all lands, easements, rights-of-way, relocations (including utilities), and dredged material disposal areas provided by the local sponsor in support of the project. If the value allowed for such items is less than 10 percent of the total cost of constructing general navigation facilities, the local sponsor shall repay an additional percentage of the total general navigation cost equal to the difference between 10 percent of the total cost and the percentage of the total cost represented by the value of such items. If the credit allowed is equal to or greater than 10 percent of said total cost, the project sponsor shall not be required to repay any additional percentage of the total general navigation cost. This report treats the disposal fee, discussed in paragraph 2.12b, as creditable toward the local sponsor's additional 10 percent repayment. In this case, instead of providing land and/or dikes for upland disposal, the sponsor is utilizing the least-cost disposal option which is open water but results in a cost paid 100 percent by the local sponsor. As such, the disposal fee was considered to be an intrinsic part of providing the dredged material disposal area. The computation of general navigation costs and the credit allowed toward the additional 10 percent of general navigation cost are shown in table 2-7.

Table 2-7

COMPUTATION OF GENERAL NAVIGATION COSTS AND ALLOWED CREDIT

Total Project Cost (Full Funded)	$371,000
Less: LERRD PSDDA Disposal Site Fee	26,000
General Navigation Costs	$345,000

Computation of Credit Allowed Toward Additional 10 Percent

LERRD	$ 26,000	= 7.5% of General Navigation
Gen. Nav.	$345,000	

Based on the above full funded cost estimate and computation of credit, the local sponsor will receive an estimated credit of 7.5 percent toward the additional 10 percent of Keystone Harbor general navigation costs. Non-Federal interests will be responsible for 27.5 percent (25.0 percent up front + 10 percent - 7.5 percent) of general navigation construction costs. In summary, total non-Federal cost responsibilities are comprised of 100 percent of the PSDDA disposal site fee, 25 percent of general navigation cost paid prior to construction contract award plus an additional 2.5 percent of general navigation to be repaid to the Federal Government either in a lump sum amount, without interest, at the end of construction or in annual installments, with interest, over a 30-year period. Itemized non-Federal construction costs are shown in table 2-8.

Table 2-8

ITEMIZED NON-FEDERAL COSTS

Item	Dollar Value
PSDDA Site Disposal Fee	$26,000
General Navigation - Upfront ($345,000 x .25)	86,000
General Navigation - Repayment ($345,000 x .025)	9,000
Total Non-Federal	$121,000

e. The Federal Government (Corps of Engineers) will pay up front for 75 percent of the general navigation cost which consists of channel dredging and disposal of dredged material less the PSDDA disposal site fee. This includes 2.5 percent of the total general navigation cost which at the option of the local sponsor will be reimbursed to the Federal Government, either at the end of construction or over a 30-year repayment period.

2.13 Financial Analysis

The purpose of the financial analysis is to ensure that the local sponsor understands the financial commitment involved and has a reasonable plan for meeting that commitment. A financial analysis consists of: (1) the non-Federal sponsor's statement of financial capability, (2) the sponsor's financing plan, and (3) the Corps of Engineers assessment of the sponsor's financial capability. All project costs have been full funded to the mid-point of construction in order to achieve a more realistic estimate of costs to be paid by project sponsor.

a. Statement of Financial Capability - The Washington State Department of Transportation statement of financial capability is presented as exhibit A on the following page.

b. Financing Plan - The sponsor's financing plan is presented as exhibit B and follows exhibit A.

c. Assessment of Financial Capability - Financing will be accomplished by the local sponsor through a WSDOT, Marine Division, 1991-93 biennium budget request for deepening Keystone Harbor. Assuming WSDOT receives requested funding from the State Legislature, the local sponsor's plan to finance its cash share of construction costs and disposal fee is satisfactory and sufficient.

EXHIBIT A

KEYSTONE HARBOR CHANNEL DEEPENING

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
MARINE DIVISION
STATEMENT OF FINANCIAL CAPABILITY

1. GENERAL

The Washington State Department of Transportation (WSDOT), Marine Division, local sponsor for the Keystone Harbor channel deepening project, is capable of meeting cost sharing and other obligations as required under the terms of the Local Cooperation Agreement. WSDOT acknowledges that its financial participation in the total project costs of $371,000 will be approximately $121,000 based upon the project cost estimate in the Draft Definite Project Report by the U.S. Army Corps of Engineers. Contract Award activities are expected to occur during Government Fiscal Year 1992, if federal funds are available, with construction starting in FY93.

2. SPONSOR CONTRIBUTIONS

Exhibit B is the sponsor's Financial Plan, which shows the estimated amount to be paid by the local sponsor and schedule of sponsor costs. Prior to construction contract award, the WSDOT will pay approximately $86,000 in cash to the U. S. Army Corps of Engineers and an estimated $26,000 to the Washington State Department of Natural Resources. Total cash requirements due prior to contract award are an estimated $112,000. After construction and within 90 days of final accounting, WSDOT will pay an estimated $9,000 in cash, without interest, to the U. S. Army corps of Engineers. These cash contributions will be funded as follows:

> CASH - The WSDOT Marine Division requested via their operating budget dated May 19, 1990, that $123,000 be authorized for dredging Keystone Harbor to -25 feet. This amount represented WSDOT estimated obligations at the time of the funding request (May, 1990). Any funding obligations above the $123,000 will be fulfilled by transferring funds from other operating program categories to the subject project. The operating budget was approved by Admiral H. W. Parker, Assistant Secretary for Marine Transportation, and is included in the agenda for the 1991 session of the Washington State Legislature.

3. CONCLUSION

Upon the approval of the Washington State Legislature, WSDOT Marine Division funding sources will be in place for a contract award in Government Fiscal Year 1992. WSDOT recognizes that the costs in the Statement of Financial Capability and Financial Plan are estimates only. WSDOT will take whatever actions are needed to have our required funds for the project available on a timely basis as requested. WSDOT understands that the local sponsor will not be responsible for contributions to future operation and maintenance costs of the Federal project.

Warren L. Johnson 5/31/91

Warren L. Johnson, P.E.
Terminal Construction Engineer

EXHIBIT B

KEYSTONE HARBOR CHANNEL DEEPENING
FINANCING PLAN

SCHEDULE OF ESTIMATED FEDERAL AND NON-FEDERAL EXPENDITURES
($1,000)

GOVT FISCAL YEAR	FEDERAL [1]	NON-FEDERAL CASH	NON-FEDERAL LERR&D	NON-FEDERAL UTIL.	NON-FEDERAL OTHER [3]	TOTAL
1992	$259	$86	$0	$0	$26	$371
REPAYMENT AFTER FINAL ACCT. (FY 1993) [2]		$ 9				

NOTES:

1. Includes an estimate of $9,000 to be reimbursed, without interest, by the local sponsor within 90 days of final accounting.

2. Sponsor will repay to Federal Government $9,000 (2.5% of total cost of General Navigation facilities, $259 + $86 = $345) as follows: Payment will be made within 90 days of Final Accounting by the Government, with no interest added.

3. Paid by sponsor to Washington State Department of Natural Resources.

Warren L. Johnson 5/31/91

Warren L. Johnson, P. E. Date
Terminal Construction Engineer

APPENDIX D

ANALYSIS OF DESIGN AND ESTIMATES OF COST

APPENDIX D - ANALYSIS OF DESIGN AND ESTIMATES OF COST

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APPENDIX D - ANALYSIS OF DESIGN AND ESTIMATES OF COST

1.01 Site Description.

a. Location. Keystone Harbor is located approximately 50 miles north of Seattle,Washington, on the eastern shore of Admiralty Inlet, the entrance to Puget Sound. The Harbor is situated on the exposed southern shore of Whidbey Island, approximately 1500 feet east of Admiralty Head. (See figure D-1).

b. Existing Project. Keystone Harbor was authorized by the River and Harbor Act of March 2, 1945, and constructed by the Corps of Engineers in 1948. The authorized project provides for a mooring basin with an area of about 6 acres and a depth of 18 feet, connected to Admiralty Bay by a channel of the same depth and 200 feet wide. A rubble mound breakwater is located at the entrance, on the east side of the channel. The harbor is used as a launching site for recreational fishermen, and as the northern terminal for the Washington Department of Transportation's ferry between the Olympic Peninsula (Port Townsend) and Whidbey Island. In February 1983 the Washington Department of Transportation (WDOT) independently deepened the channel to approximately -22 feet mean lower low water (MLLW) and widened the channel to slightly less than 200 feet at a depth of -22 feet MLLW. The most recent maintenance dredging by the Corps was in 1987. The Corp's Oct 1987 condition survey shows mid channel depths varying from -19.8 feet MLLW to -28.2 feet MLLW (sta. 13+00), with an average depth of approximately -21 feet MLLW.

c. Prior Studies. Other than studies related to the initial construction and subsequent maintenance, there are no prior studies pertaining to navigation improvements at Keystone Harbor, Washington.

1.02 Climatology. Keystone Harbor is typical of temperate coastal embayments with cool, dry summers and mild, wet winters. Locally, strong winds occur due to the influence of the Strait of Juan de Fuca and to the surrounding Cascade and Olympic mountains. Precipitation in the Keystone Harbor area averages 18 inches per year, and temperate marine water buffers air temperatures which, on the average, range from a January low of 39.4° F to a high of 61.3° F in July and August.

1.03 Tides and Tidal Currents. Tides at Keystone Harbor are typical of the Pacific coast of North America. Tides are of the mixed type with two unequal highs and lows each day. Tidal range datums for Admiralty Head, as published by the National Ocean Survey, are as follows:

DATUM PLANE	ELEVATION REFERRED TO MLLW
Highest Tide (Estimated)	12.00
Mean Higher High Water	8.40
Mean High Water	7.70
Mean (Half) Tide Level	5.10
NGVD	7.73
Mean Low Water	2.50
Mean Lower Low Water	0.00
Lowest Tide (Estimated)	-4.50

Tidal currents in the Admiralty Inlet area can be very strong. The NOAA Tidal Current Tables for the Pacific Coast of North America and Asia show speeds in excess of 4.8 knots at Admiralty Head. Except for the region influenced by the breakwater, tidal currents along the north shore of Admiralty Bay flow primarily to the west, for both ebb and flood tides. Reports by the ferry masters indicate that, away from the influence of the breakwater, strong currents may flow both east and west depending on the tidal condition.

1.04 Winds and Wind Generated Waves. The Harbor entrance is exposed to wind waves from the east, south, and west, and to ocean swell from the west. Storm generated waves approach from the southwest to southeast. Waves generated by winds exceeding 70 miles-per-hour can reach a height of approximately 7 feet, with periods of 5 to 6 seconds. The maximum estimated wave at the harbor entrance has a height of 7.0 feet and a period of 5 to 6 seconds. These winds and waves, combined with the strong cross-currents and narrow channel width, make Keystone Harbor the most difficult ferry landing in Puget Sound.

1.05 Longshore Transport. The predominant littoral drift directions are east from Admiralty Head, and north and west along the east and north shores of Admiralty Bay. Construction of Keystone Harbor in 1948 created a littoral trap for the Admiralty Head feed source. The effect of the trap is shoaling inside Keystone Harbor and erosion of the beach immediately east of the breakwater. The present rate of shoaling in the harbor is about 6,500 cubic yards per year. Dredge cycle frequency is every 4 to 5 years, and the dredge material is deposited on the shore to the east of the breakwater as beach nourishment. For nearly 30 years the material dredged from the channel has balanced that eroded from the downdrift beach.

1.06 Subsurface Exploration. Subsurface exploration for the Keystone Harbor project was conducted by Seattle District, Corps of Engineers. Nine Vibracore test holes were drilled on December 7, 1990, using a 4-inch diameter Vibracore sampler. The nine Vibracore samples were taken for biological, chemical, and physical analysis in conjunction with Puget Sound Dredged Disposal Analysis (PSDDA) guidelines. Visual classifications from the Vibracore tubes were made in accordance with the "Unified Soil Classification System." The foundation materials consist primarily of medium to dense silty sands in the northern region of the dredge site. The southern region of the dredge site consists of a loose to medium gravelly sand (1" minus) layer atop the medium to dense silty sand with gravel (1" minus). At the dredge site, shell composition ranged from no shells (0 %) to 5 % with an average of about 3 % shell fragments by volume. See plates 1 and 2 for Vibracore test hole locations and logs.

1.07 Existing Navigation Conditions. To maintain steerage while entering the narrow Keystone Harbor channel, the ferries enter the harbor at full speed (12 knots), and begin backing down approximately 600 feet from the ferry dock (sta. 10+00). Under low tide conditions, close proximity of the bottom significantly affects vessel handling. A bottom clearance of less than 7 feet can induce propeller cavitation which reduces reverse thrust and rudder "bite" at an extremely critical point in the docking maneuver. For these reasons, none of the ferry captains will attempt a landing at Keystone Harbor when tide elevations are -2.5 feet MLLW or lower.

SECTION 2. DESIGN FEATURES AND ANALYSIS OF THE RECOMMENDED PLAN

2.01 General. This section presents the design features and analysis of deepening the present 18-foot-deep navigation channel. The present depth of the Keystone Harbor channel is too shallow for safe and economical navigation. Tidal delays due to insufficient bottom clearance are well documented and significant transportation costs due to tidal delays have been quantified. In determining the needed channel improvements, the major design considerations were those related to a channel depth which would afford safe and efficient vessel operation. Factors considered in determining channel depth were the interaction of tidal currents, wind and waves, vessel speed, and the effects of bottom proximity on vessel controllability.

2.02 Proposed Project. The federally authorized depth of the 200-foot-wide channel is presently -18 feet MLLW. The recommended plan provides for increasing the authorized depth to -25 feet MLLW from the channel entrance to the ferry terminal (station 5+00 to station 15+00), but without cutting back existing channel side slopes. (see plate 1).

2.03 Channel Design.

a. Design Vessel. Ferries now in use on the Port Townsend - Keystone Harbor run are Steel Electric class ferries. These vessels are 256 feet long, 73 feet 10 inches wide and draw 13.5 feet when fully loaded. The ferries are double ended, with propellers and rudders at both ends. When docking, the use of both bow and stern rudders and propellers is required. According to a naval architect retained by the WDOT, these propellers will begin to cavitate at full reverse when the bottom is closer than 7 feet. Docking maneuvers at Keystone Harbor require a high degree of skill and experience, and although outwardly identical, handling characteristics of the ferries are so important that the masters will use certain vessels, and even particular ends, when docking conditions are critical, eg. high current speeds, high winds, and low tides.

b. Channel Width. Interviews with the ferry masters indicate that, although a wider channel would make entering Keystone Harbor easier, channel depth was the factor that most influenced vessel handling. With a channel maintained at a depth of -25' MLLW, sailings would not be cancelled due to low tide conditions, unless the master determined that some special combination of factors, (wind seas, currents, tide height, etc.), made conditions unsafe.

c. Channel Depth. The proposed plan includes dredging to a depth of 25 feet plus 2 feet of contractor over depth allowance, for a total depth of 27 feet. This channel depth was determined by assuming the maximum vessel draft of 13.5 feet, an extreme low tide of -4.5 feet MLLW and a clearance of 7 feet. Deepening the entire channel is required to allow uniform vessel response

during the use of full reverse for maneuvering at any point in the approach to the ferry terminal.

d. Channel Side Slopes. The existing side slopes of the inner channel vary from 1 vertical (V) on 2.8 horizontal (H) to 1 V on 3.8 H. These slopes appear to be very stable, showing no evidence of slumping. The proposed deepening will not include cutting back the existing channel side slopes, so the channel width of 200 feet will not be obtained at the -25 foot depth. Since the deepening is intended to provide propeller clearance, a slightly narrower channel at the -25 foot depth is not considered a problem.

e. Ship Simulation. Due to the minor nature of the channel modification, a ship simulation of the project was not conducted. Deepening the channel may slightly reduce the influence of hydraulic forces on vessels in the channel, but the primary change will be to provide additional propeller clearance to prevent cavitation.

2.04 Aids to Navigation. Deepening the channel will not require any modification to existing aids to navigation.

2.05 Dredging and Disposal.

a. Construction. Construction of the authorized project would require approximately two months to dredge 48,000 cubic yards of material. Maintenance dredging material would be given first priority for disposal at the adjacent beach nourishment site. Therefore, dredging for project deepening would be by clamshell dredge, with disposal by bottom-dump barge at the Port Townsend site, a PSDDA designated openwater disposal site located 14 nautical miles to the west (see figure D-1). Dredging is constrained to the months of December 1 to March 15 due to fisheries considerations. Sediment samples collected and tested for chemicals of concern under PSDDA guidelines indicate that all the material to be dredged is suitable for open water disposal.

b. Maintenance. The existing channel traps essentially 100 percent of the littoral transport and no increase in maintenance dredging requirements for this project are expected.

2.06 Effects on Adjacent Shorelines. No impacts on adjacent shorelines in the project area are expected. Since the channel is not being widened, no shallow subtidal or intertidal area will be removed by the dredging. Channel deepening would enlarge the cross-sectional area of the existing entrance channel by about 10 percent at mean high water. The resulting change in the tidal dynamics of the turning basin would be so minor that the effects on circulation or water quality would be negligible. The increase is not expected to alter flushing and/or water quality or change the manner in which wind waves, or tidal currents affect the adjacent shorelines.

SECTION 3. COST ESTIMATE AND SCHEDULE

3.01 Cost Estimate.

a. Construction. The total quantity of material to be dredged is estimated at 43,000 cubic yards. The total estimated cost for initial construction of the proposed navigation improvements is $343,000. Details of the estimate of construction costs are shown in Table D-1. These costs assume dredging by clamshell dredge and disposal by bottom dump barge at a designated deep water disposal site located in the Strait of Juan de Fuca, 14 nautical miles west of Keystone Harbor. The estimate assumes all the dredge material is suitable for unconfined open-water disposal. All dredge quantities include an allowance of an additional 1 foot of depth for advance maintenance and 1 foot for contractor overdepth allowance. Allowance for quantity contingencies are included in the 1 foot of contractor overdepth allowance.

3.02 Schedule.

a. Design and Construction. The tentative design and construction schedule, assuming adequate funding and local sponsor assurances, is shown below. This dredging and disposal sequence will be investigated further during Plans and Specifications but was developed considering: (1) anticipated availability of dredge equipment, (2) environmental considerations, and (3) costs.

Item	Date
Submit Final Definite Project Report to Div	Oct 1991
Initiate Plans and Specifications	Dec 1991
Advertise Construction	Jul 1992
Award Contract	Sep 1992
Complete Construction	Jan 1993

****** TOTAL PROJECT COST SUMMARY ******

PROJECT: KEYSTONE HARBOR CHANNEL DEEPENING STUDY
DISTRICT: SEATTLE DISTRICT
DATE PREPARED: 21 MAY 1991

PREPARED BY: TOKUNAGA
REVIEWED BY: PIERCE
PRICE LEVEL: OCTOBER 1990

ACCOUNT NUMBER	ITEM DESCRIPTION:		ESTIMATED COST: 1 OCT 90	CONTINGENCY AMOUNT ($)	%	TOTAL EST COST 1 OCT 90	MID-POINT CONSTRUCTION DATE (MO-YR)	OMB INFLATION FACTOR (%)	INFLATION TOTAL AMOUNT ($)	CURRENT FULLY FUNDED COST
12.0.A.	MOBLIZATION		46,900	12,100	26%	59,000	12-92	9.0%	5,000	64,000
12.0.4.	DREDGING - DEEP WATER DISPOSAL (48,000 CY @ $3.20)		153,600	38,400	25%	192,000	12-92	9.0%	17,000	209,000
12.0.1.	PSDDA SITE USE FEE (48,000 CY @ $0.40)		19,200	4,800	25%	24,000	12-92	9.0%	2,000	26,000
	TOTAL CONSTRUCTION COST		$219,700	$55,300	25%	$275,000			$24,000	$299,000
30.	PLANNING, ENGINEERING AND DESIGN	1 /	32,600	8,400	26%	41,000	04-92	6.0%	2,000	43,000
31.	CONSTRUCTION MANAGEMENT (S & I)		21,700	5,300	24%	27,000	12-92	9.0%	2,000	29,000
	TOTAL PROJECT COSTS		$274,000	$69,000	25%	$343,000			$28,000	$371,000

1 / INCLUDES $2,000 FOR FINALIZING LCA BY CENPS-RE

APPROVED
Chief, Cost Engineering Branch
Date 22 May 91

U.S. ARMY CORPS OF ENGINEERS, SEATTLE DISTRICT